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The U.S. M1A1 ABRAMS tank; the Shackleton AEW.2 long-range radar aircraft; Sweden's SAAB-105 light ground-attack aircraft; the U.S. aircraft carrierr JOHN F. KENNEDY

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DISLOCATION OF TROOP CONTROL (ACCORDING TO VIEWS OF U.S. AND NATO SPECIALISTS)

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[Article by Col V. Tamanskiy, candidate of military sciences, docent: "The Dislocation of Troop Control (According to the Views of U.S. and NATO Specialists)"]

[Text] Along with development of an unprecedented arms race, in order to achieve military superiority over the Soviet Union and the other states of the socialist community, the military-political leadership of the NATO member countries continues to make improvements in the forms and methods used to conduct military operations under present-day conditions. Experience gained in recent local wars and armed conflicts and the content of present-day official exhortations and instructions, and also other material published abroad, indicate that command of NATO and the course and outcome of military actions in theaters of military operations depend directly on its own abilities to dislocate troop control on the opposing side. Accordingly, the NATO specialists regard disorganizing enemy troop control as an important question associated with preparing for and conducting operations in theaters of military operations; the main propositions of this were first formulated in the late Seventies by Pentagon specialists and were subsequently also approved by military circles in the other NATO countries.

To judge from material in the Western press, dislocation of troop control on the opposing side can under present-day conditions include an aggregate of measures and comprehensive actions by headquarters and troops aimed at denying an enemy true information about headquarters and troops in the NATO joint armed forces and their plans of action, or at making the acquisition of such information as difficult as possible, and at dislocating the normal function of enemy command posts and communications centers, and also at insuring protection of their own control system. These requirements to some extent reflect the present views of the U.S. and NATO commands on the system of troop control as an interlinked aggregate of control organs and control points and communications and intelligence systems insuring purposeful and timely influence by commanders at all levels on the troops under their command.

In order to achieve success in dealing with the troop control system, during operations in a theater of military operations the NATO joint armed forces command considers it necessary to resolve the following tasks: to expose this

system, destroy control posts and communications centers and deny intelligence, and also protect its own control system against enemy intelligence and countermeasures. To this end provision is made for using the resources available to intelligence, electronic combat [EC], fire power and nuclear destruction and special operations units and subunits, and also for implementing an extensive range of measures to insure security and concealment.

During a war the NATO joint armed forces in the Central European theater of military operations, which includes two army groups and two combined tactical air force commands, will have at their disposal the most significant resources for dealing with the opposing side's troop control system. The resources involved in the dislocation of troop control organizationally make up part of the formations of the joint land forces and the tactical air force.

Identifying the Troop Control System.

As noted in material in the Western military press, it is planned to identify the troop control system and engage in intelligence gathering long before the commencement of operations. In order to resolve this task use will be made of the reconnaissance resources available to the NATO joint armed forces in the theater of military operations, as represented by reconnaissance units and subunits of the land forces and air force. In addition, the NATO joint armed forces supreme command in the theater may obtain intelligence data from special operations units and subunits and from the national headquarters of the bloc member countries.

As applied to the Central European theater, according to assessments made by foreign specialists, within the NATO land forces reconnaissance groups from two British reconnaissance regiments, 27 reconnaissance battalions (three Belgian, 10 American, 11 West German and 3 Dutch) and 10 reconnaissance companies (three from West Germany called deep reconnaissance companies) can be used to identify targets within the troop control system. During the course of direct preparations for war the number of reconnaissance subunits can be increased by strengthening forces in the theater of operations mainly with U.S. divisions, each of which has its own reconnaissance battalion.

In order to gather intelligence data on targets within the troop control system the joint air force command can use up to 9 reconnaissance squadrons from the two U.S. air armies (more than 30 RF-4C aircraft), the West German tactical Air Force command (more than 70 RF-4E's), the British Air Force command in the FRG (15 Jaguar GR.1's), and the Belgian and Dutch tactical air force commands (18 Mirage-5BR's and 18 RF-16's).

In line with the requirements of official manuals in the U.S. Army, reconnaissance units and subunits in divisions and army corps are to acquire data to a depth of up to 150 kilometers. At the same time, by using the reconnaissance groups (or patrols) formed from special operations subunits, targets in the troop control system may be identified at a depth of more than 450 kilometers.

Reconnaissance aircraft from the squadrons of the NATO joint air forces in the

theater of operations are capable of identifying targets in the troop control system to depths of up to 1,000 kilometers. As materials in the foreign military press note, when this is done the opportunities for reconnaissance forces and capabilities will be most fully realized only with the commencement of military actions.

Under peacetime conditions and during the period of preparation for operations (without violating airspace or state borders) the depth to which electronic facilities, for example, in the UHF range using ground-based radio and radiotechnical intelligence-gathering capabilities, can identify targets is up to 30 kilometers, or up to 400 kilometers using airborne facilities. The depth at which targets can be identified using photographic, radar and infrared intelligence-gathering facilities is 30 kilometers. It has been reported that when the reconnaissance-strike complexes go into service with the joint tactical air force command, radiating electronic sources (radars during the first stage) will be identified to a depth of 600 kilometers. In order to increase the depth of reconnaissance for targets the NATO joint armed forces command in the theater of operations organizes cooperation with the national headquarters of the bloc member countries.

For timely and effective use of other resources in the process of dislocating troop control on the opposing side the NATO joint armed forces command in the theater of operations allocates an important place to questions of organizing the acquisition of intelligence data and passing it to higher headquarters. In particular, the time from the moment of acquisition to the time that information on the enemy is passed to brigade (according to the requirements of the U.S. command) should be 15 to 30 minutes; the time for it to be passed to division 1 hour, and to corps, no more than 2 hours.

Suppression and Destruction of Elements in the Opposing Side's Troop Control System.

It is planned to accomplish this by using the electronic jamming capabilities of special operations units and subunits, and also by carrying out conventional fire and nuclear strikes against major targets.

The electronic combat resources of the NATO armed forces in the Central European theater have been divided organizationally into two groups (the 5th and 7th U.S. army corps), 7 battalions (in 4 U.S. divisions and 3 West German corps), and 13 companies (in individual U.S. armored regiments and FRG divisions), and also several squadrons (in the NATO joint air forces). During the period of direct preparation for operations in the theater the number of reconnaissance and EC groups and battalions can be increased by transferring and deploying formations of the U.S. land forces in the theater.

Such units and subunits insure detection of electronic facilities for troop control by the opposing side and reduce the efficiency of their operations and jam them, and also provide protection for their own similar resources against reconnaissance and electronic countermeasures. To carry out these missions they are equipped with facilities for radio and radiotechnical intelligence gathering and electronic countermeasures and monitoring that are set up in the troop formations in special vehicles and armored personnel carriers and on

aircraft and helicopters of the air armies; this provides them with a capability to use those facilities both on the ground and in the air. Depth of penetration into enemy electronic capabilities operating in the UHF range is 20 to 30 kilometers from ground-based facilities and up to 100 kilometers for airborne facilities; for electronic jamming from the ground and from the air the figures are up to 30 kilometers and up to 40 kilometers respectively.

The NATO joint air force command in the theater of operation plans to use airborne jamming facilities on eight EF-111a"s (U.S. aircraft) and seven HFB-320's (West German) capable of identifying and disrupting the operation of electronic facilities up to a distance of 400 and 300 kilometers respectively. The foreign press emphasizes that the capabilities of the NATO joint armed forces in the theater of operations to suppress the electronic facilities of the opposing side will increase significantly in 1987 when six EC-130H Compass Call aircraft designed to suppress communications networks and centers go into service with the U.S. Air Force in Europe.

The F-4G Wild Weasel strike aircraft will play an important role in suppressing and destroying air defense radars (there are 24 of these aircraft in the U.S. Air Force Europe). In order to expand capabilities to destroy radars it is planned to bring into service with the FRG Luftwaffe two squadrons of Tornado-ECR's totaling 35 aircraft (they will make up the 32nd and 38th fighter-bomber squadrons in 1989); in terms of designated use they are similar to the U.S. F-4G.

NATO specialists assign a significant role to one-time-use jammer transmitters that it is planned to deliver to the target-suppression region using aircraft and helicopters from the army air force and the tactical air force, ant to rockets and artillery, and help provided by personnel in subunits deployed in the enemy rear. In given regions these transmitters will operate automatically for 10 or 20 minutes and, they reckon, will be adequately effective in suppressing electronic capabilities.

Electronic combat resources will be put into operation from the start of military actions in the interests of identifying and suppressing electronic facilities most fully. However, even in peacetime some of them are being used to carry out intelligence-gathering tasks and protect their own troop control facilities.

It is emphasized in official U.S. and NATO manuals that EC facilities should be used in combination with attempts to inflict fire damage. The NATO joint armed forces command plans to use the latter to destroy (neutralize) technical intelligence-gathering facilities, communications centers and control organs and control posts. Fire damage can be inflicted using missile and artillery units, motorized (or tank) subunits of the land forces, and also air force units and subunits of the army air forces and tactical air forces. When this is done, long-range artillery has the capability to destroy targets to a depth of up to 30 kilometers; helicopters have a capability of up to 60 kilometers, operational-tactical missiles up to 120 kilometers, and tactical aircraft 300 kilometers or more. The capability of the NATO joint armed forces to destroy

targets in the troop control system at operational depth will increase significantly when the new cruise and ballistic missiles go into service.

The foreign military press notes that aircraft of the tactical air force now represent the main capability for inflicting fire damage over great distances. Available resources enable the NATO joint armed forces command in the theater of operations to destroy command posts and communications networks and centers in both first-echelon and second-echelon opposing forces, which is in line with the idea of "deep strikes," expressed in the U.S. (and NATO) concept of "airland operations (engagements)" or "combat with second echelons."

It is proposed to use the resources of nuclear fire power available to the NATO joint armed forces command against the most important and best protected targets in the troop control system located at considerable distances from the line of contact. The Western military press notes that LANCE missiles can be used for this purpose; these are in service with divisions under the command of NATO land forces corps in the theater of operations (there are about 80 launchers). Nuclear-capable aircraft and Pershing and cruise missiles can also be used to destroy command posts and communications networks and centers.

Special operations units and subunits can be used to destroy the most important targets in the troop control system that cannot be destroyed by other means or whose destruction would entail particular difficulties. The foreign press emphasizes that the following units and subunits would most likely be used at the start of operations in the Central European theater: a British special operations regiment that can be formed as up to 48 detachments each of 10 to 20 men (penetration depth up to 400 kilometers); a U.S. special operations battalion (located in the FRG) made up of a headquarters, a headquarters detachment and three companies (each made up of a control detachment and six operations detachments each comprising 12 to 14 men); and a U.S. Ranger battalion cable of moving up to 60 groups each of 6 or 7 men almost 450 kilometers into the enemy rear. In addition, each division in the U.S. land forces is capable of forming 12 reconnaissance-and-sabotage groups to strike targets up to a depth of 150 kilometers, while the FRG motorized infantry and tank division can field more than 10 such groups.

Protection of Friendly Troop Control Systems.

The foreign press notes that the purpose of protecting friendly troop control systems is to create the most favorable conditions for the effective functioning of their control organs and control facilities under conditions of increased enemy reconnaissance and the extensive enemy use of electronic suppression and conventional and nuclear fire capabilities. It is intended to accomplish this task through secure control and implementation of organizational and technical measures promoting immunity for control, and also by means of actively influencing the reconnaissance, electronic suppression and conventional and nuclear fire capabilities of the opposing side.

The former makes it possible keep secret from the enemy the existing troop control system and the information passed along lines of communication. Security in control is helped by the use of equipment that hides

communications channels, high-directional antennas for communication only with a given element and a number of other measures.

As it makes efforts to insure control integrity, the NATO joint armed forces command moves to the forefront questions of enhancing the survivability of the control system and its immunity against jamming. The main method used to enhance survivability and immunity against jamming is the skillful combination of fixed hardened control posts and mobile (ground or air) control posts, and also the comprehensive use of different kinds of communications facilities. Good immunity against jamming is achieved by developing more advanced technical facilities for control systems and equipping the troops with them, implementing various kinds of organizational measures, for example, regularly changing carrier frequencies, restricting the time that communications facilities transmit (to 10 to 30 seconds), operating radio stations at the lowest possible power, using line communications and so forth.

Countermeasures against enemy intelligence-gathering resources pursue the aim of denying or minimizing the acquisition of true information about the grouping, operational formation and plans of action in the NATO joint armed forces in the theater of operations. It is proposed to achieve this goal by organizing and implementing a set of measures to insure security, concealment, electronic jamming and inflicting conventional (or nuclear) fire damage on enemy intelligence-gathering facilities.

Appropriate subunits have been formed in order to insure security. For example, the U.S. land forces army corps each have a company whose mission is to insure security (each company includes a counterintelligence platoon and a platoon that insures secure troop control), five commands for counterintelligence and secure troop control in each division, and four counterintelligence sections in individual armored regiments and brigades. One of the main missions for these subunits is to hide information from the enemy by dealing with agent penetration and the operation of agents' technical facilities. Subunits that insure secure troop control monitor the operation of their own electronic facilities so as to deny the enemy access to information contained in electromagnetic emissions from transmitting devices.

Concealment is effected by means of secrecy, demonstrative actions, simulation and disinformation. It is aimed at confusing the enemy regarding the true grouping of forces in the theater of operations and the intentions of the command in using those forces. Concealment measures are worked out by the NATO joint armed forces chief command and implemented by the troops and the counterintelligence subunits.

Active influence on intelligence-gathering facilities, electronic jamming and conventional and nuclear fire damage is aimed at suppressing or neutralizing them and is accomplished by use of similar friendly capabilities.

It is considered that carrying out these complex missions requires careful planning of measures and the organization of troop actions even during peacetime, and also at the stage of direct preparations for operations and during the course of operations. Responsibility for the organization of combat to deal with troop control devolves on the NATO joint armed forces

commander in chief and staffs in the theater of operations and the commanders and staffs of the army groups and combined tactical air force commands, while responsibility for implementing measures rests with intelligence-gathering resources and special operations units and subunits; the commanders and staffs of the air armies and national tactical air force commands and the commanders of army corps, divisions and individual units are responsible for security, electronic jamming and inflicting conventional (or nuclear) fire damage.

The most important functions of commanders in chief (and commanders) and staffs in organizing combat to deal with troop control are as follows: evaluation of the situation, planning the combat use of available intelligence-gathering resources, electronic combat, capabilities to inflict conventional and nuclear fire damage and special operations units and subunits, and organizing the coordination of all branches of the armed forces involved in an operation, and also assigning missions to those under their command.

During the course of the evaluation of the situation an analysis is made of information characterizing enemy control organs and control posts, his communications and intelligence-gathering system, and also the opportunities available to friendly intelligence-gathering and electronic combat resources and the capabilities for inflicting conventional and nuclear fire damage, and of special operations units and subunits. The main aim of this work is to prepare conclusions and proposals for intelligence work and reduce the effectiveness of or suppress or destroy elements of the enemy troop control system identified.

The NATO command regards work on measures and determination of procedure for the actions of units and subunits to deal with the enemy troop control system as a very important and integral part of operations planning in the theater of operations. Thus, a determination is made of the sequence, time periods and methods to be used to handle these tasks, resources are allocated for them, and these resources are given target allocations in line with the operations plans, along with procedure for coordinating different resources to deal with set targets, and the main provisions concerning the control of the various units and subunits during the course of the operation. The measures planned and the combat actions by the troops are reflected in the operations plan of the high command of the NATO joint armed forces in the theater of operations and of the land forces and air force groupings, formations and units within the theater, and also in the various proposals (on intelligence-gathering, concealment, disinformation, security, electronic combat and the combat use of capabilities to mount conventional and nuclear strikes).

During planning, special attention is paid to the mutually agreed use of electronic combat, conventional (or nuclear) fire damage and special operations units and subunits available to the NATO joint armed forces command in the theater of operations. In order to neutralize targets within the enemy's first- and second-echelon control system, which corresponds to the American concept of "airland operation (engagement)" and the NATO concept of "attacking second-echelon forces (reserves)," and also in order to make the most effective use of available resources, the NATO joint armed forces command provides for the organization of neutralization of targets using the ground-

based and air-based electronic combat capabilities of the land forces to a depth of up to 100 kilometers, while electronic suppression aircraft (the EF-111A, HFB-320 and EC-130) are used to a depth of 300 kilometers or more.

In peacetime the resources of the NATO joint armed forces in the theater of operations are focused mainly on carrying out two missions, namely, identifying elements of the troop control system and dealing with the intelligence-gathering resources of a putative enemy. The latter is accomplished mainly by carrying measures to insure security and concealment.

During a period when the situation deteriorates the activity of TOE resources used to dislocate troop control are activated in order to deny or hamper to the maximum enemy acquisition of information on direct preparations for any operation by NATO joint armed forces in the theater of operations, and also in the interests of clarifying data obtained earlier on elements of the control system. With the commencement of military operations the NATO joint armed forces command directs the main effort of TOE and attached resources toward electronic combat and inflicting conventional (and nuclear) fire damage on identified targets in the enemy troop control system.

In the organization of combat actions the NATO joint armed forces command allocates a major place to possible methods to disrupt troop control; the basis of this is the idea of destroying groupings of opposing forces throughout the entire depth of the operational structure. Here, Western military specialists single out the following methods:

--the massive use of resources earmarked to neutralize and destroy targets in the control system located in first- and second-echelon groupings of the opposing troops and to disorganize their actions along the lines of the NATO joint armed forces' main strikes. From the standpoint of organization, this method is among the most complicated because it requires from the NATO joint armed forces high command clear-cut solutions to questions concerning the coordination of different resources not only in depth but also along the lines of strikes.

--massive use of electronic combat resources and forces to inflict conventional and nuclear fire damage so as to neutralize control organs and control posts, sources of information, and communications networks and centers along the line of the main strike launched by the NATO joint armed forces in the theater of operations. Compared with the former method, this method provides a greater concentration of resources in order to destroy targets across a relatively narrow zone.

--selective use of resources earmarked to destroy the most important targets in the troop control system at specified stages of an operation so as to disrupt possible counterstrikes by the enemy.

--a combination of massive use of resources and the selective use of those resources.

Thus, to judge from material in the Western military press, the NATO joint armed forces command allots a major place in combat operations in a theater of

operations to dislocating enemy troop control, and it is on this that achieving victory depends. In order to extend the opportunities for acting against targets in the enemy troop control system the NATO joint armed forces command plans to bring into service with formations and units advanced, specialized electronic jamming facilities and capabilities to inflict fire damage on the control posts and communications networks and centers of the opposing side.

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SOVIET MILITARY JOURNAL: U.S. VIOLATES BIOLOGICAL CONVENTION

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 3, Mar 87 (signed to press 5 Mar 87) pp 15-18

[Article by P. Akimov: "The United States Is in Violation of the Biological Convention"]

[Text] As it strives to achieve its hegemonic aims the Reagan Administration is reckoning on a breakdown in international agreement in the field of limiting strategic arms and has set a course toward the militarization of space and continues with the prohibited development [razrabotka] of new kinds of weapons of mass destruction. In violation of obligations assumed under the 1972 Biological Convention and in defiance of the hopes and aspirations of most states to prevent the retention of bacteriological (biological) and toxin weapons in the arsenals, in the United States they are still conducting research to prepare for bacteriological warfare and at the same time are waging a deliberate campaign to undermine and discredit this convention, and also the 1925 Geneva Protocol. This line pursued by the U.S. government was clearly seen in the work of the 2nd conference of signatory states to review the force of the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction (which took place in Geneva in September 1986).

During the years that have elapsed since the first such forum (in 1980) the authority of this important international document has grown significantly: new states, including the PRC and France, have signed it, and as a result all the permanent members of the UN Security Council are now signatories to the Biological Convention.

During the course of the discussions most of those attending the conference unanimously stated their firm resolve on behalf of humanity to eliminate the possibility of the use of microbial or other biological agents or toxins as weapons, again affirmed their decisive support for the convention, expressed unwavering adherence to its principles and aims, and confirmed their legal obligation under international law to implement and strictly comply with its provisions. At the same time, in a number of the speeches misgivings were voiced that scientific and technical progress and the outstanding achievements in the field of biotechnology, including genetic engineering methods, could be used for purposes incompatible with the main provisions of the Biological Convention. The question was raised of whether, in connection with these achievements, there were not now loopholes making it possible to possess new

varieties of bacteriological (biological) and toxin weapons in evasion of the convention. Those attending the conference reaffirmed that the pledges assumed by states signatory to the convention do apply to all such achievements. The unanimous final declaration emphasized that the convention covers the prohibition of the use of all toxins (whether peptides or nonpeptides) of microbial, animal or plant origin, including any analogues obtained by means of synthesis.

During the course of the discussions considerable attention was paid to problems of the peaceful use of the achievements of biotechnology and the development of international cooperation in this field. However, a basic clash of opinion developed around measures to further strengthen trust in compliance with the convention's provisions, and also on the question of improving the mechanism whereby complaints are passed on and checks on such complaints are organized.

In order to prevent or reduce cases in which ambiguities, doubts or suspicions arise, and also in the interests of developing peaceful cooperation in the field of biotechnology, those attending the conference agreed to implement the following measures on the basis of mutually acceptable cooperation:

--to provide information on the designations, locations and main avenues of activity being conducted by research centers and laboratories supplied with state-of-the-art equipment and meeting the highest national and international safety requirements, established in order to conduct experimental work with biological materials and agents that create a high risk to the lives and health of individual persons or groups of people among personnel at such center and laboratories or of the population in the immediate vicinity of such facilities;

--to report on all outbreaks infectious disease that are distinguished from regular diseases of that kind in terms of type, development, location and time;

--to encourage publication in scientific journals of the results of biological research relating directly to the convention, and also promote the use, for permitted purposes, of knowledge gained in the course of such research;

--actively to promote contacts between scientists engaged in biological research directly related to the convention, including exchanges to conduct joint research on an agreed basis.

Those attending the conference concluded that it is essential to hold a special meeting of scientists and technical experts from signatory states in order finally to work out a unified procedure for the exchange of information on the matters listed above. Many expressed themselves in favor of further improvement in the existing mechanism for passing on complaints, and of UN Security Council sanctions to be imposed on those violating pledges (provision is made for this in the convention).

Jointly with the GDR and Hungary, the Soviet Union introduced a proposal to convene without delay a special conference to draw up and adopt a protocol as

a supplement to the existing convention, in which would be formulated a procedure, legally binding on all signatory states, for monitoring complaints, including on-site investigations by an international control commission. This produced a stunning effect on the U.S. representatives and the representatives of a number of countries in military alliance with the United States. Through their efforts this proposal was blocked despite the support and approval for it from the overwhelming majority of signatory states.

Foreign observers note that the position taken by the United States is explained by the fact that the U.S. leadership has misgivings about international control of its activity in fields related to the Biological Convention because within the United States work continues to create [sozdaniye] bacteriological (biological) and toxin weapons. Moreover, the Americans are engaged in efforts aimed at legalizing this unlawful development work [razrabotka] sooner or later. To this end the enemies of the Biological Convention have developed vigorous activity along several avenues. In particular, in statements by officials of the U.S. administration and in official publications, the importance and efficacy of the convention is belittled in every possible way. The real activity of the military authorities, and also of laboratories in industrial firms and in universities that are contracted with the Pentagon in the field of creating [sozdaniye] new kinds of bacteriological (biological) weapons, technologies for their manufacture and methods for their use in combat, is being hidden from the public. Massive propaganda campaigns are being waged against the Soviet Union, accompanied by ill-intentioned slander alleging that it has violated the Biological Convention. Thus, in December 1986 the American press carried its latest falsehood, published in what it called an "intelligence document" in which the same accusations were made against the socialist countries as at the 2nd conference.

During the course of that conference the U.S. delegation distributed the text of a statement by Deputy Assistant Secretary in the U.S. Department of Defense, D. Feith, whose main theses were examined by one of the committees of the U.S. House of Representatives. This apologist for biological warfare deliberately hyperbolizes the achievements of biotechnology, reduces the manufacture of bacteriological (biological) and even toxin weapons merely to the cultivation of a given agent in nutrients, and deliberately excludes the stage of creating [sozdaniye] the recipe and packing such agents in munitions or other means used to deliver them, such as require special technological equipment and engineering support to insure safety when such work is being done. This way of depicting the process of manufacturing bacteriological (biological) and toxin weapons, when, according to Feith, they become available to any microbiology laboratory, was needed in order to "prove" that it is impossible to exercise any kind of control over their production, and also to justify the final conclusion for which all these constructs were adduced. In his opinion, "the convention is false advertising to the world that the problem of biological weapons can allegedly be resolved." These ideas were put forward on behalf of the U.S. government by the U.S. delegation to the plenary session at the conference. However, those attending did not agree with the U.S. assessments and they unanimously underscored the great political importance of the Biological Convention, which has prohibited one of the kinds of weapons of mass destruction that kill people.

The United States has never been a supporter of a total ban on bacteriological and toxin weapons. It signed the 1972 Biological Convention only under pressure from world public opinion, which was actively involved in the struggle against the U.S. military's evil deeds in Vietnam, Laos and Cambodia during the shameful aggression in Southeast Asia. The foreign press concludes that while formally a signatory to the convention, the United States continues work on bacteriological (biological) and toxin weapons and is maintaining production capacities to produce them.

In order to hide from the public the fact that work is being done to create [sozdaniye] biological weapons, the U.S. leadership has repeatedly resorted to various kinds of subterfuges and even direct falsehood. Thus, even before the Biological Convention went into force former President R. Nixon announced that he had made arrangements for the main center for the development [razrabotka] of bacteriological and toxin weapons at Fort Detrick (Maryland) to be disbanded and a cancer treatment center to be set on there, while a toxicology center was to be organized on the basis of the production facilities at Pine Bluff (Arkansas). This statement by R. Nixon was rightly assessed by the American press as obvious deceit, and this is why.

The Pentagon is concerned with transferring its center for the development [razrabotka] of bacteriological and toxin weapons from Fort Detrick to the U.S. Army proving ground at Dugway (Utah) so as to hide it away from the public in a remote place in the area of the Deseret Desert, to which access is extremely limited and strictly controlled by the military authorities. However, work on bacteriological weapons at Fort Detrick itself has not been stopped even for an hour. It is there that the U.S. Army Scientific Research Institute for Infectious Diseases is located, where they study the pathogens of the most dangerous exotic diseases. Patients seriously ill with infections of unknown origin are admitted to its clinic. In fact the army institute for infectious diseases has been converted into a supplier of new strains of pathogens of the most dangerous infections for the Dugway proving ground, as material for the possible development [razrabotka] of combat recipes for biological agents.

The U.S. journal SOLDIER has noted that personnel at the infectious disease institute have a high level of protective equipment. However, even these means of protection do not always save members of the institute staff from diseases because their patients are particularly dangerous and the forms of their infections have been poorly studied. According to other reports, over the past years several people have died as the result of contamination with dangerous infectious diseases, and 465 cases of dangerous infectious diseases have been recorded among the staff.

Development [razrabotka] and testing of bacteriological weapons at the Dugway proving ground have been carried on since World War II. The Baker biological laboratory now functions there. According to the Western press, it is to there that the scientific sections from Fort Detrick and Pine Bluff have been transferred, a total of about 440 people. More than $300 million have been allocated for reconstruction of the Baker laboratory and other projects at Dugway.

At the Baker laboratory a network of buildings has been set up with equipment and a containment system that make it possible to conduct experiments concerned with creating [sozdaniye] aerosol biological formulas and conducting large-scale test work with pathogens for very high risk infections. Pentagon representatives are trying to convince the public that the latest equipment at the Baker laboratory will supposedly be used only for permitted activities concerned with creating [sozdaniye] means for protection against biological weapons. But even the American press does not take this version from the military authorities seriously. It is not therefore happenstance that in CHEMICAL AND ENGINEERING NEWS, the journal of the American Chemical Society, it was rightly noted that the kind of unique equipment at this military laboratory was installed not so much to create [sozdaniye] means of protection against biological weapons as to test aerosol formulas based on bacteriological (biological) agents.

After the biological convention entered into force (25 July 1975), some 50 wild horses died near the Baker biological laboratory from an exotic African disease whose pathogen is being tested at the Dugway proving ground as a biological agent for military use. This proving ground is now virtually not used at all for testing chemical weapons but has been given over almost entirely to work to create [sozdaniye] and test bacteriological weapons. Chemical munitions in simulated casings are being tested at other U.S. Army facilities; field tests are conducted at newly created test areas at the nuclear proving ground in Nevada.

The U.S. administration has put abroad a version that the Pine Bluff arsenal is for peaceful purposes, and that a national toxicology center has been set up at the base. But foreign specialists think that the toxicology center at Pine Bluff started to be created long before the U.S. administration's decision to sign the Biological Convention. And it was set up at the site mentioned, but outside the boundary of the army arsenal. The fermenters, loading lines and cryogenic installations and the underground containment system for holding samples of bacteriological weapons were retained and kept in working order. There has simply been no kind of reallocation of this military facility for peaceful use. Moreover, new technological equipment has been delivered there for filling munitions with bacteriological formulas. According to assessment by specialists, this kind of equipment is not needed for a toxicology center. It has been reported that it is precisely at this arsenal that the production of binary chemical weapons will be developed to augment existing chemical warfare factories.

The compilation and distribution in the armed forces of manuals, instruction guides and handbooks on the handling of bacteriological weapons and rules for their storage, transport and even combat use is a direct violation by the United States of the Biological Convention.

Under contract with the Pentagon many universities and institutes in the United States are conducting research whose main purpose is to develop [razrabotka] combat formulas for biological agents. This research involves work on improving the resistance of pathogens to the process of producing aerosols when particles of the aerosol drift in the atmosphere. Experiments

being conducted on aerosol infection of laboratory animals with cholera and dysentery toxins, and also staphylococcic enterotoxins, that is, using a method not encountered under natural conditions and of no interest to public health. Using genetic engineering methods, the genes responsible for biosynthesis of strong toxins are being inserted into the cells of saprophytic microflora (for example, E. coli), which also does not serve the interests of public health.

In order to conceal its unseemly activity connected with noncompliance with obligations under the Biological Convention the United States is waging a disinformation campaign and spreading slanderous inventions about imaginary violations of international treaties by the Soviet Union.

During the course of the conference of states signatory to the Biological Convention some delegations rightly drew attention to the fact that accusations made against the Soviet Union have increased sharply since the present administration arrived in the White House, and that the peaks in this activity always coincide with the moment when military programs and allocations are confirmed.

Everyone knows, however, that the almost 70 years of cooperation between the Soviet Union and other countries testify to the fact that it has strictly and punctually complied with the obligations it has assumed under international treaties. Our state is also strictly complying with its obligations under the Biological Convention and the 1925 Geneva Protocol. This cannot be said of the United States, which would not only like to forget the Reykjavik agreement on moving toward a nuclear-free world, is violating the SALT-II Treaty, and is attacking the ABM Treaty, but is also trying to acquire one of the most dangerous means for the mass destruction of people, namely, the latest bacteriological weapons.

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COMBAT USE OF NATO AIRBORNE AND AIR ASSAULT TROOPS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 3, Mar 87
(signed to press 5 Mar 87) pp 19-25

Article by Col L. Levadov and Lt Col V. Kholmogorov: "Combat Use of NATO Airborne and Air Assault Troops"]

[Text] In line with the new U.S. strategy of "direct confrontation," which envisages the massive use of military force as the main means of achieving world diktat, and under its direct influence, in many of the countries that are U.S. allies in NATO a review has been conducted of national military doctrines in order to define the most effective ways to build up the offensive capabilities both of their own armed forces and of NATO as a whole. In order to resolve these tasks the pace is being forced in developing and equipping the troops with new-generation nuclear and conventional strike systems, the organizational structure of the troops is being improved, troop control processes are being everywhere automated, theaters of military operations are being prepared ahead of time, the level of headquarters and troop combat readiness is being raised, and during the course of exercises the plans for operations during the initial period of war are being worked on and clarified. Here, most attention is being paid to developing those branches of troops that are earmarked to play a decisive role in today's offensive engagement (operation). Foreign military specialists include airborne troops and air assault troops in this category. In this article, prepared from material in the foreign press, we consider the main stages in the creation of these troops in the capitalist states and their status and prospects for development, and also their possible use in modern combat.

Airborne troops appeared in foreign armies on the eve of World War II and the early years of the war. They were most developed in fascist Germany, the United States and Great Britain. In 1943 the TOE of the of the German fascist troops included an airborne assault army, three independent airborne brigades and an independent airborne landing division. The Anglo-U.S. command had an airborne army at its disposal by the end of the war.

During the war years the airborne operation became the basic form for the joint use of formations of airborne troops, air forces and other branches of the armed forces to transport and insert airborne troops and carry out combat missions in the enemy rear in order to achieve operational or operational-and-strategic aims. The largest airborne landing operations were conducted by the German fascist troops in Norway and Denmark in 1940 and during the seizure of

the island of Crete in 1941, and by Anglo-American troops in France (Normandy) and Holland in 1944.

During the postwar period the development of airborne troops in the main capitalist countries was greatly influenced by the numerous local wars and military conflicts unleashed by the forces of international imperialism against states that had freed themselves from colonial dependence. Airborne troops were used extensively during the course of the wars of aggression in Korea and Vietnam and to suppress national liberation movements in Africa and Latin America. They played a decisive role in the marauding attack by U.S. imperialism on independent Grenada. And everywhere they have been assigned the role of a leading detachment in forces specially created for invasion.

The establishment and development of air assault troops has been associated with the adoption of various types of helicopters in the armed forces of the capitalist states during the postwar period. In this connection a realistic base was created for solving one of the key problems of the military art, namely, eliminating the trailing position of troop maneuvering capabilities as compared to nuclear and conventional fire power. Foreign military specialists considered that infantry moved to the battlefield aboard assault helicopters accompanied by fire-support helicopters would be able to make more effective use of the results of nuclear and conventional strikes than when engaging in combat using traditional methods.

The United States was the first to set up air-mobile formations and units. The 1st Air-Mobile Division, made up of 428 helicopters and 6 fixed-wing aircraft, was formed in July 1965. It was immediately sent to South Vietnam, where at that time the United States had started to escalate the aggression against the freedom-loving Vietnamese people. At the same time the 101st Airborne Division and a number of other land forces formations and units already in Vietnam were reformed as air-mobile formations.

Analyzing the experience gained in the war in Vietnam, the U.S. command was forced to acknowledge that on the whole the air-mobile troops had not justified the hopes placed in them. Under the conditions of a poorly established theater of military operations they were not very effective even when engaged in combat actions against partisans and in protecting extended lines of communication, and in actions against groupings of regular troops they suffered considerable losses from troop air defense facilities. Their fire power was manifestly inadequate, while the supply system could not provide for prolonged independent operation. It became clear that the air-mobile division, which in fact had remained a light infantry division adapted to carry out raids by helicopter against the tactical rear of the enemy, could hardly be effective in carrying out missions under the conditions to be found in the European theaters of military operations.

Since the early Seventies the United States and NATO have been pursuing course aimed at creating air assault formations that combine air mobility with considerably greater fire support. The first formation of this kind was the U.S. 101st Air Assault Division, reformed from the air-mobile division. In other countries the process of forming similar troops was only in its initial stage.

NATO now has three airborne landing divisions (U.S., West German and French), an air assault (U.S.) and an air-mobile (French) division, and four independent airborne landing brigades (two Spanish, one Turkish, one Italian), and also several independent parachute regiments and battalions. In some countries the airborne troops also include sabotage and reconnaissance units and subunits ("commandos," "rangers" and so forth). The organizational structure and weapons of these formations are shown in table 1 below.

Table 1. Numerical Strength, Combat Makeup and Main Weapons of Airborne, Air Assault and Air-Mobile Formations in the NATO Land Forces.

Personnel and combat makeup and main weapons	United States		France		FRG
	ABT	AAT	ABT	AMT	ABT
Personnel	16371	18076	12500	6500	9430
	COMBAT MAKEUP				
Brigade HQ	3	3	-	-	3
Parachute battalions (or regiments)	9	9[1]	(6)	(1)[2]	9
Tank battalions	1	-	-	-	-
Reconnaissance battalions (or regiments)	1[3]	1[3]	(1)	-	-
Artillery divisions (or regiments)	1	1	(1)	-	3[4]
Antiaircraft divisions	1	1	-	-	-
Army air force battalions (or regiments)	1	1	-	(3)	-
	MAIN WEAPONS				
Tanks	54	-	-	-	-
Regimental artillery	54	72	-	-	-
Mortars	120	120	102	20	48
Antitank guided missiles	384	411	180	48	300
Artillery (self-propelled)	48	48	115	-	144
Helicopters	218	402	-	214	-
including helicopters with antitank missiles	21	63	-	90	-

Notes: [1] air-mobile infantry battalions [2] infantry regiment
[3] air-mobile reconnaissance battalions [4] mortar companies

ABT = airborne troops; AAT = air assault troops; AMT = air-mobile troops

* * * * *

In recent years the expansionist aspirations of the imperialist powers in Asia, Africa and Latin America have exerted considerable influence on the development of the NATO airborne and air assault troops. Stating that these continents and large expanses of water in the world's oceans are regions of

their "vital interests," the United States and its bloc allies have engaged in intensive training for special expeditionary forces earmarked for actions outside the "NATO zone."

The first of these were the "rapid deployment forces" created by the United States; its example was later followed by Great Britain, France and Italy. The rapid deployment forces include the most combat ready contingents of mechanized, airborne and air assault troops, tactical and transport air forces, amphibious and escort elements of the naval forces and the marines.

A joint central command has been set up in the United States for operational management of the rapid deployment forces and its "zone of responsibility" includes the territory of 19 countries in northeast Africa and southwest Asia and the adjacent Indian Ocean. The command headquarters is located at the MacDill Air Base in Florida. The following are under its command: the headquarters of the 3rd Field Army and the 9th Air Army, the 18th Air Assault Corps (a light infantry division, the 82nd Airborne Division, the 101st Air Assault Division, the 24th Mechanized Infantry Division, the 6th Independent Antitank Brigade, and the 1st Rear Command), seven tactical fighter air wings and two squadrons of strategic bombers. Long-range radar detection aircraft and the AWACS E-3 system, strategic reconnaissance aircraft, air command posts, up to three aircraft-carrier groups from the Pacific Ocean Fleet, and a marine division and brigade can also operate in the interests of the rapid deployment forces. In order to carry out acts of aggression in any part of the world. on instructions from the U.S. Joint Chiefs of Staff and with the permission of the President, a grouping of forces of the required makeup can be formed from these formations and units and be placed under the operational command of the joint central command in order to carry out specified missions.

Rapid deployments forces have been set up in Great Britain, France and Italy on the same principle. The French forces have the greatest numerical strength and they include five divisions (the 4th Air-Mobile Division, the 6th Armored Division, the 11th Airborne Division, the 27th Alpine Infantry Division, and the 9th Marine Infantry Division). The British and Italian rapid deployment forces are formed from brigades (motorized infantry, parachute and alpine), units of the tactical and transport air forces, and amphibious and escort naval forces and marines.

Simultaneously with the creation of the "rapid deployment forces" the basic premises are worked out for their use, the headquarters and troops carry out intensive operational and combat training, and the experience gained by them during the course of armed conflicts in Lebanon, Chad, and the South Atlantic in connection with the Falkland Islands (the Malvinas) and the aggression against Grenada is analyzed.

U.S. military specialists think that actions by the U.S. rapid deployment forces in individual regions (for example, in the Near and Middle East) can take the form of a strategic operation consisting of simultaneous or consecutive airborne, air-mobile and naval operations. The most likely region for this kind of operation is the Persian Gulf zone. It is considered that using the maximum number of forces and capabilities in such an operation would involve more than 200,000 men, up to five divisions of land troops and

marines, about 1,000 combat aircraft and 50 ships.

The role of assault echelon in a combined air and naval landing operation is assigned to airborne troops, whose mission will include the seizure of airfields, ports and important administrative and political objectives in order to insure that the main body of forces can be transferred, and to destroy the state and military command system. In parallel with the airborne landing along the coast it is proposed to start landing marines in order to establish bridgeheads. Then the air assault units will be brought in to hold and extend the bridgeheads and also to attack the enemy rear. Later, in order to complete the rout of the enemy it is proposed to build up the grouping of interventionist forces by transferring infantry and mechanized formations by air and sea.

According to the plans of the U.S. command, these kinds of operations should be conducted jointly with other NATO countries. The armed forces of the United States' allies in any given region (for example, in the Near and Middle East this would be Israel and the reactionary Arab regimes) will also be involved in such operations.

Foreign military specialists think that the basic condition for achieving success in these kinds of operations is surprise, which can be achieved mainly through rapid deployment and swiftness of troop actions. According to the Western press, the U.S. Air Force now has 76 of the C-5A and C-5B strategic transport aircraft and 234 C-141's, from which the required number can be used to move rapid deployment forces. It is reported that it will take 9 days to move the 82nd Airborne Division from the United States to the Persian Gulf zone; 10 days are needed for the 101st Air Assault Division, and 4 for a light infantry division. Up to 30 days are needed to move the 24th Mechanized Infantry Division by sea. This calculation has been made by U.S. experts as a variant when all rapid deployment forces formations and units are in the continental United States. If, however, most of them are moved to forward bases in the Near or Middle East or other regions under the guise of maneuvers, then an operation can be initiated by the forces in a grouping created ahead of time and it will be reinforced during the course of the action.

In recent years the U.S. leadership has implemented a number of measures to insure forward basing for the "rapid deployment forces." In particular, the United States has obtained the right to make use of more than 30 airfields and naval bases in the Near East and has carried out intensive work to modernize and expand them. The question of deploying an operational group headquarters from the joint central command has been resolved, and also that of having a small contingent of troops in the Persian Gulf area. It has become the practice to conduct the large-scale BRIGHT STAR exercises annually. Nevertheless, to judge from statements by individual experts, the greatest effect can be achieved when these forces act directly from U.S. territory. In order to reduce the time taken for airlifts and sealifts and increase their volume, new types of transport aircraft are being developed (the C-17) and

existing aircraft (the C-5A) modernized, and large-tonnage transport ships are under construction.

The versions for using the rapid deployment forces of the United States and other NATO countries can be most varied depending on the political aims of the leadership in the imperialist powers, the makeup and grouping of enemy forces and the conditions in the theater of military operations. The foreign press emphasizes that an airborne operation on a strategic scale will be more likely to take place when aggression is initiated against an independent state that possesses adequate armed forces. It is thought that the allocation of forces of battalion to brigade strength is adequate to carry out police actions against small countries.

The airborne and air assault troops of the United States and other NATO countries acting as part of the rapid deployment forces have gained combat experience in the local wars and armed conflicts unleashed by the imperialist powers in recent years. At the same time it is the opinion of military experts abroad that this experience should not be overestimated and even less blindly applied in resolving tasks in a war waged on a well-equipped theater of operations against a strong and well-armed enemy. Here, what they have in mind is a war primarily against the USSR and the other Warsaw Pact countries, toward which the main efforts of the imperialist powers are directed. The foreign press notes that the most probable region for conducting large-scale airborne landing operations in Europe could be the North European and South European theaters. Each year during the NATO joint armed forces DISPLAY DETERMINATION exercises in the area of the Black Sea straits work is done on a combined landing operation that includes units of airborne troops and marines from the United States, Great Britain, Turkey and Italy. Questions of preparing for and carrying out landing operations in the Arctic and on the Baltic littoral are resolved during the course of the NATO TEAM WORK exercises.

According to the views of the NATO command, conducting major landing operations in Central Europe, particularly during the initial phases of a war, is unlikely. The high troop density, the presence of a strong air defense and the mainly open nature of the terrain may create considerable difficulties in making a major landing in the enemy rear. It is thought that the use of operational and tactical landings will be typical of this theater.

The airborne landing operation conducted within the framework of the strategic offensive operation in a given theater is the basic form for the operational use of airborne troops. It is planned to involve an airborne landing division in this, which can be moved to the enemy rear to a depth of up to 200 kilometers in order to seize and hold an important region or perimeter, destroy lines of communications and disrupt troop movements.

Foreign military experts think that the most favorable conditions for conducting airborne landing operations are created after breaking through the enemy defenses to tactical depth and achieving air superiority, that is, on the second or third day of an offensive. Three or four days before the offensive starts the airborne landing division must be in a forming-up place 200 to 250 kilometers away from the line of the front. There it will be

deployed by battalions near to the loading airfields. When this is done one airfield is designated for each battalion. Loading and securing heavy equipment on parachute platforms starts 24 hours before the start of the transfer, and boarding of personnel about 2 hours before the start.

The Western press reports that more than 400 sorties by C-141 and C-5 transports will be needed to move a fully equipped U.S. airborne landing division; a French airborne division will require 600 sorties by the C-160 Transall and the C-2501 Noratlas. It is planned to move divisions to the landing area usually at night along three routes at speeds of 400 to 500 kph. Altitudes will be 2,000 to 3,000 meters while the aircraft are flying over their own troops and 50 to 1,000 meters over enemy territory, along a corridor 2 to 4 kilometers wide. In the landing zone 10 to 12 zones jump zones are designated for a division and 4 to 6 landing zones. The parachutists will jump from low altitudes--250 to 600 meters. Up to 40 minutes are allowed for a battalion to assemble and make ready for combat actions. The division's mission is to seize an area along a front of 20 to 50 kilometers in depth or two or three major objectives. Defenses are organized to hold them, made up of battalion regions and company strong points and adapted to effect an all-round defense. An airborne landing division is capable of operating independently for two or three days.

In the foreign press the question is being repeatedly raised of the possibility of conducting air-mobile operations in European theaters. Whereas earlier, doubts were being expressed about the effectiveness of using major air-mobile formations against a strong enemy, now with the enhanced defensive capability and fire power of combat helicopters and the transformation of the air-mobile division into an air assault division, U.S. military experts are allowing the possibility that this kind of division can be used in Central Europe at full strength.

An attacking air assault division operating 100 to 150 kilometers ahead of the attacking grouping of forces could be given the mission of disrupting the planned withdrawal by the enemy and the intermediate positions he occupies, and of destroying his nuclear assets, control posts and targets in the rear in operational depth, and seizing water crossings and bridgeheads in order to guarantee that the main forces are not slowed down when crossing waterways.

In defense the air assault division can be given the mission of closing exposed flanks in the combat order of the force grouping, destroying enemy troops that break through, and conducting holding actions in front of the forward edge when the enemy is not in close contact.

From the experience gained in exercises by the NATO joint armed forces, in order to conduct air-mobile operations provision has been made for creating reinforced mechanized infantry and tanks subunits and air-mobile brigade groups from the air assault division. These usually include air-mobile infantry, helicopter-borne antitank and one or two mechanized (or tank) battalions, an artillery division, and combat support subunits, that is, air and land echelons are set up.

Air-mobile subunits making up the air echelon can be landed to a depth of 10 to 15 kilometers from the forward edge (the average distance for artillery fire) with the task of seizing a specified objective or position and holding it until the arrival of the mechanized (or tank) subunits. Afterward, another jump of 10 to 15 kilometers is made. These kinds of raids along the entire line of the advance also constitute the basis of the air-mobile operation. The most favorable conditions for conducting them are found, according to U.S. military experts, after the enemy's defensive resistance has been broken and gaps have been opened up in his defense and his flanks exposed. From the standpoint of physical geographical conditions the greatest effect can be achieved when the air assault division operates in terrain that affords cover and is moderately rugged, where the enemy is deprived of the ability to organize a solid defense.

As a rule the air-mobile division is assigned a zone 15 to 30 kilometers wide, while the battalion zone is 5 to 10 kilometers wide. Before being committing themselves to combat the air-mobile subunits occupy loading zones earmarked for each brigade at a distance of 25 to 30 kilometers from the forward edge. The airlift of the air echelon of a brigade to the landing zone is done along a single route along an air corridor 2 to 4 kilometers wide at the lowest possible altitude, skirting round the terrain. Initial strikes by the air forces and artillery fire destroy the enemy air defense assets identified along the route. If sites of enemy resistance remain along the flight route, before the division commits to combat a short softening-up bombardment is carried out during the course of which artillery, combat helicopters and tactical air forces destroy the manpower and fire capabilities at strong points and artillery at their fire positions, command posts and second-echelons (reserves) in close depth. At a distance of 5 to 8 kilometers from the landing zone the battalions split up, and this is followed by a spreading of the company columns to debouch in their designated zones (or directions) to carry out the raids.

In addition to conducting airborne and air-mobile operations in both advance and defense, the use of tactical airborne landings is also planned. While carrying out the common mission of helping land forces advancing from a front or on the defensive, these landings are designed to destroy important targets in the enemy rear, dislocate his control and seize and hold important positions, regions or bridgeheads.

In line with the concept of "airland operation (engagement)" airborne landings are regarded as one component in the "strike in depth" delivered in order simultaneously to destroy an opposing grouping of enemy forces throughout the entire depth of its operational structure. In an army corps a brigade may be designated for the landing, in a division a battalion, and in a brigade a company. Experienced gained in exercises shows that for an army corps an airborne landing is made to a depth of 50 to 70 kilometers; for a division or brigade the distance is 15 to 20 kilometers or 5 to 10 kilometers respectively. In all more than 100 such tactical airborne landings may be made during the course of an offensive waged by a coalition group of armies.

The NATO land forces command thinks that the massive use of airborne landings on various scales and raids at various depths by air assault troops can create

a constantly operating front in the rear of enemy defending troops. According to the NATO strategists, this should guarantee rapid development in an offensive, split and defeat the main enemy troop groupings unit by unit in the Central European theater and thus achieve the aims of a first strategic operation.

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DEALING WITH LOW-FLYING TARGETS

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[Article by Lt Col A. Tolin, candidate of military sciences: "Dealing with Low-Flying Targets"]

[Text] In the capitalist countries, primarily those in the aggressive NATO bloc, besides equipping the land forces with more efficient kinds of offensive weapons, considerable attention is paid to improving their air defense capabilities. Basing decisions on experience gained in local wars and exercises, which have shown the growing influence of troop air defense in success in missions carried out by land forces, in the leading capitalist states various kinds of resources used to deal with airborne targets are being modernized and developed. Here, taking into account the extensive use of aircraft flying at very low altitudes, military experts abroad attach great importance to dealing with low-flying targets [LFT's], including helicopters and unmanned drones.

The Western press notes that although the PATRIOT (long-range) and the improved HAWK (medium-range) missile complexes are capable of destroying LFT's it is more rational to use them to deal with high- and medium-altitude raids by aircraft. Accordingly, short-range self-propelled and towed surface-to-air missile [SAM] launchers and antiaircraft artillery are regarded in foreign armies as the assets to deal with LFT's. In addition, according to recent reports light portable SAM launchers with guided antiaircraft missiles and a multirole missile launcher are being developed, along with antiaircraft complexes and launchers with combined missile and artillery mountings. At the same time work is underway to develop automated control systems for troop air defense sets and target-acquisition radars. Short-range self-propelled and towed SAM launchers in service with the land forces of the capitalist countries (see table 1 below) include the CHAPARRAL (United States), the ROLAND-1 and ROLAND-2 (FRG, France), the RAPIER (Great Britain), the CROTALE and CHAIN (France), the SPADA (Italy), the 81 (Japan) and the SKYGUARD-SPARROW (Switzerland). In the opinion of foreign military experts, these SAM launchers are effective air defense assets capable of dealing with LFT's both as part of fire subunits and independently.

Table 1. Main Tactical-Technical Characteristics of Some Kinds of SAM's in Foreign Armies

Designation, Country in which developed, Date went into service	Range, km maximum / minimum	Maximum height of intercept, km	Missile Characteristics: length m.	diameter m.	weight kg: missile / warhead	maximum speed m/sec	Guidance
Short-range self-propelled and towed SAM's							
CHAPARALL U.S. 1969	4 (pursuit) / 0.8	2.5	2.9	0.13	84 / 5	850	passive IR
ROLAND-2, FRG France, 1976	6.2 / 0.5	5.5	2.4	0.16	62.5 / 6.5	580	radio comman
RAPIER, Great Britain 1974	5 / 0.5	3.6	2.24	0.13	43.5 / 0.5	650	radio comman
CROTALE, France 1971	8.3 / 0.5	3	2.94	0.16	80 / 15	800	radio comman
81 Japan 1981	10 / .	4	2.7	0.16	100 / .	700	passive IR, inertial
SKYGUARD-SPARROW Switzerland	10 / 1.5	6	3.6	0.2	205 / 30	700	semiactive radar
Portable SAM's							
REDEYE U.S. 1965	3.6 (pursuit) / 0.5	3.5	1.22	0.07	8.2 / 0.5	600	passive IR
STINGER U.S. 1979	5.2 (pursuit) / 0.5	3.5	1.52	0.07	9.5 / 1	700	passive IR
BLOWPIPE, Gt. Britan 1972	3 / 0.6	1.8	1.35	0.076	11.3 / 2	700	radio comman
JAVELIN Gt. Briain 1985	5 / 0.3	2	1.4	0.076	. / .	.	radio comman
MISTRAL France, exper.	6 / 0.5	3	1.8	0.09	17 / 3	about 900	passive IR
RBS-70 Sweden 1977	5 / about 1	3	1.32	0.106	15 / 1	600	laser beam

The ROLAND-1 and ROLAND-2 SAM's are joint Franco-West German developments with the same tactical and technical characteristics but distinguished by the type of self-propelled chassis used (the AMX-30 tank or the MARDER armored personnel carrier respectively), and also by the type of tracking system used. In the clear-weather ROLAND-1, target and missile tracking is by optical and infrared devices respectively, while for the all-weather ROLAND-2 this is also done using radar. Each SAM launcher includes a target-acquisition radar (range up to 15 kilometers), a computer to calculate guidance commands, a transmitter to pass the radio commands, and 10 SAM's on a transporter-launcher. Two containers with the missiles are carried on the launcher and eight in two identical revolver-type magazines carried inside the vehicle.

The single-stage missile (with a two-mode solid-fuel engine) has a normal aerodynamic configuration. It is equipped with a hollow charge warhead and a proximity fuse. Tracer compound is located in the tail section of the missile for infrared guidance.

The British RAPIER SAM launcher is made in a self-propelled and towed version. The clear-weather version of the towed RAPIER includes a guidance unit, the launcher, the missile, a control panel for selecting the arc of fire, and an electric power source. The guidance unit has an optical sight for guidance to the target and a television device for automatic tracking of the missile.

The launch vehicle is a semi-trailer on which the launcher and four missiles are mounted, a target-acquisition radar for airborne targets, a computer and a transmitter for the command guidance. The RAPIER single-stage solid-fuel SAM has a normal aerodynamic configuration and is equipped with semi-armor-piercing warhead and a percussion fuse.

The all-weather version of the RAPIER additionally includes a BLINDFIRE radar for airborne target tracking and missile guidance.

In 1984 the self-propelled version of the RAPIER went into service with the British land forces. In this version all elements are mounted on the U.S. M548 tracked transporter chassis. The launcher carries eight missiles.

A new version of the RAPIER SAM, called the LASERFIRE RAPIER, is now in the final stage of development. In this version a laser device is used for automatic target tracking from the angular coordinates and range. In order to improve target indication accuracy, essential for locking the laser beam onto the airborne target, the centimeter-range acquisition radar has been replaced by a set with a range of up to 10 kilometers, operating in the millimeter wavelength.

All elements of the LASERFIRE RAPIER including the launcher with four ready-to-fire missiles are mounted on a platform on a vehicle or semi-trailer. The time needed to bring the launcher to the firing position is about 3 minutes. Reloading is done manually.

The Japanese 81 SAM is made in the form of two main elements, namely, the launcher and the fire control system, mounted on trucks. Ready-to-fire missiles with infrared homing heads are mounted on two guided launchers.

The fire-control vehicle has a multirole radar with a flat-top phased-array antenna, a computer, a guidance organ and an indicator. The foreign press notes that the radar (range 30 kilometers) provides for search and simultaneous automatic tracking of six targets. When the two most important targets come enter the launch zone the command to open fire is given to the launcher.

In the opinion of Western military experts, the portable SAM's in service with foreign armies shown in table 1 are, thanks to their relatively low cost compared with other air defense assets, an essential element for providing defense against low-flying targets. Reports in the foreign press also point out that bringing into service the STINGER (United States) and JAVELIN (Great Britain) SAM's, which have better features than their corresponding counterparts, the REDEYE and the BLOWPIPE, has improved the capability of those countries' land forces to deal with low-flying aircraft and helicopters.

Compared with the RED EYE, the U.S. STINGER SAM has a greater zone of destruction and can be fired not only along pursuit courses but also head-on courses, including at supersonic targets. The first batches of these SAM's were produced with missiles that employed an all-aspect infrared homing head with a cooled receiver operating at wavelengths of 4.1 to 4.4 micrometers. Now the STINGER is being produced with the new POST joming head with two frequency ranges. It operates in the infrared and the ultraviolet, thanks to which, as asserted in the foreign press, it can function when IR countermeasures are employed. The electronic equipment in the homing head includes a microprocessor built with solid-state elements.

The British JAVELIN SAM is an improved version of the BLOWPIPE with a greater target destruction range (thanks to the installation of a new engine). In order to improve firing efficiency and reduce the effect from the combat work of the operator, in this SAM use is made of a semi-automatic command guidance system. In contrast to the manual guidance method used in BLOWPIPE, which provides for simultaneous operator tracking of both the target and the missile, with the semi-automatic system his task is reduced to holding the target in the center of an optical sight in the guidance unit. Missile tracking and measurement of its deviation from the line of sight and transmission of appropriate commands to the SAM is done automatically with the aid of a television device and a minicomputer. The missile is equipped with a more effective warhead.

Judging from reports in the Western press, the French MISTRAL portable SAM is in the final stage of development. Foreign military experts think that thanks to new design solutions this complex will be capable of effectively destroying fast-moving airborne targets up to a distance of 0.5 to 6 kilometers, and also helicopters, including those with low levels of thermal radiation.

The complex consists of a SAM mounted on a transporter-launcher, a sighting device and a tripod stand. The solid-fuel missile, 1.8 meters long with a diameter of 90 millimeters, has a canard aerodynamic configuration. The 17-kilogram missile is equipped with a 3 kilogram fragmentation warhead filled with small tungsten balls. French experts think that use of a streamlined

nosecone of pyramidal form has made it possible considerably to reduce aerodynamic drag on the missile and achieve high flight speeds. Thus, it is noted that when the missile is fired at a helicopter at a range of 4 kilometers the missile flight time is 6 seconds. The missile employs an infrared target seeker with a mosaic receiver (indium arsenide) and a microprocessor. It is noted that the warhead possesses a high degree of immunity against jamming.

To judge from reports in the foreign press, light SAM's mounted on mobile launchers are being developed in the United States, France and Sweden. Thus, in the United States the AVENGER and SETTER launchers with STINGER missiles are being developed on the basis of the light, multirole enhanced mobile M966 HAMMER.

In the AVENGER SAM the operator's cabin with two launchers (each with four STINGERS) is mounted on a stabilized platform designed offers the capability of launching a missile while moving. The cabin contains a sight, command organs and an indicator. Eight SAM's can be loaded in 4 minutes.

The SAM launch equipment includes a liquid argon cooling system for the target seeker receivers. This system makes it possible to carry out a second firing sequence if the first is for any reason aborted.

The SETTER SAM complex is capable of destroying both airborne targets and targets on the ground. In addition to the eight STINGER SAM's it also includes 54 hypersonic SPIKE rocket projectiles (six 9-projectile units) with an effective range of 1.2 kilometers (velocity 1,500 meters per second).

The AVENGER and SETTER complexes can be transported by air and by helicopters using external pods. Three of them can be carried on the C-130 and four on the C-141.

In France a wheeled armored vehicle forms the basis of the light MISTRAL SAM being developed. It includes a launcher with six missiles carried in containers mounted on both sides of a turret, together with an optical sight and a television viewfinder for firing missiles in the dark. It is also noted that the possibility is now being examined of equipping this launch complex with a RODEO-2 radar, with whose aid, in particular, it would be possible to detect hovering helicopters.

In Sweden, the M113 tracked armored carrier is being used as a base in development of the ARMAD SAM launcher using the RBS-70 SAM capable of destroying low-flying fixedg-wing and rotary-wing aircraft. The launcher is designed to provide cover for tank subunits. It includes an acquisition radar for airborne targets with a range of 12 kilometers. Missile guidance is done with a laser beam.

The ADATS multirole missile complex (for further details on this see ZARUBEZHNOYE VOYENNOYE OBOZRENIYE No 2, 1987, pp 33-35) developed jointly by the Erlikon (Switzerland) and Martin Marietta (U.S.) firms, is designed to destroy high-speed low-flying aircraft, combat helicopters, unmanned drones

and armored targets on the ground. It is noted that maximum range against airborne and ground targets is 8 kilometers and 6 kilometers respectively.

The complex is based on the U.S. M113A2 tracked armored carrier. It includes eight missiles in a transport-container, a target acquisition radar, electronic and optical apparatus for target tracking and missile guidance, a computer and other equipment. The radar is capable of acquiring airborne targets at a range of up to 20 kilometers and ground targets up to 6 kilometers. The missile (2 meters long and weighing 51 kilograms) is laser-beam guided and equipped with a 12 kilogram warhead with a hollow-charge high explosive and two types of fuses, namely proximity and percussion. The latter is used against ground targets.

To judge from reports in the Western press, artillery antiaircraft mountings still play an important role in dealing with low-flying targets. Foreign military experts think that despite the provision of land forces with short-range SAM's the need for tube artillery for air defense results from a number of advantages for these weapons. The chief of these are the following: quick reaction time, the ability to switch fire rapidly from one target to another, the ability to fire at both airborne and ground targets, the insignificant dimensions of the engagement zone in the vicinity of the firing position, and ease of operation and storage of ammunition.

According to foreign military experts, the best of the air defense mountings in service with foreign armies in the West German GEPARD 35-millimeter twin-barreled self-propelled antiaircraft artillery system. It is noted that after production of the U.S. SERGEANT YORK was halted in 1985 (because of its serious defects, found during the course of testing), the West German weapon is now the only all-weather self-propelled antiaircraft artillery system in service with the land forces of the capitalist countries.

A 35-millimeter twin-barreled self-propelled antiaircraft artillery system similar to the GEPARD is now under development in Japan (called the AW-X). It is pointed out that it is being developed on the basis of a tank and will have a fire control system with a target-acquisition and tracking radar, a digital computer, and a stabilization system that provides the capability of firing while moving.

In the opinion of Western experts, because of the range of the antitank guided missiles with which combat helicopters are equipped, in order to deal with them successfully it is necessary to increase the range of tube artillery. Here, one way of resolving this task is considered to be the development of larger-caliber weapons.

In Italy, using the OF-40 main tank as its base, the OTO Melara firm has developed the OTOMATIC single-barreled self-propelled antiaircraft artillery system with an effective range of up to 6 kilometers. The 76-millimeter automatic gun that it uses has a maximum rate of fire of 120 rounds a minute. It is fired in bursts of six shells. The ammunition load (70 shells) device will take various kinds of ammunition, including shells with ready-to-fire contact elements and built-in radar fuses.

Table 2. Main Tactical-Technical Characteristics of Self-Propelled and Towed Air Defense Artillery

Designation, Country in which developed Date went into service	Weight tons	Weight of shell / Muzzle velocity meters/sec	Maximum effective slant range kilometers	Rate of fire * rounds per min	Munitions load carried
Self-Propelled					
GEPARD 35-mm self-propelled artillery mount, FRG, 1976	45.0	0.55 / 1175	4	550	680
30-mm twin-barreled, based on AMX-13 tank, France, 1966	17.2	0.36 / 1000	3.5	600	600
MADIS 25-mm quadruple, Italy, 1987	12.5	0.5 / 1100	2	570	630
VULCAN M163 20-mm six-barreled, U.S., 1968	12.3	0.12 / 1030	1.5	500	1800
Towed					
L70 40-mm single barreled Sweden, 1951	4.8	0.86 / 1000	4	300	122
GDF-001 35-mm twin-barreled Switzerland, 1963	6.4	0.55 / 1175	4	550	112
ARTEMIS-30 30-mm twin-barreled, Greece, experim.	6.2	. / 1300	3.5	800	500
VULCAN M167 20-mm six-barreled, U.S. 1968	1.8	0.12 / 1030	1.5	500	500
Mk20 Rh202 20-mm twin-barreled, FRG, 1972	1.64	0.12 / 1050	2	800	550
TARASK 20-mm automatic gun, France, 1976	0.66	0.12 / 1050	1.5	740	140
GA1-B01 20-mm automatic gun, Switzerland, 1954	0.4	0.125 / 1100	1.5	1000	50

* for one barrel

The fire control system on the Italian artillery system includes a radar with separate target-acquisition and tracking channels, an optical tracking device for airborne and ground targets, a television-and-optical target-tracking device with a laser range finder, and main and backup computers. In combat configuration the system weighs 43 tons and has a crew of three.

Dealing with low-flying targets is an important air defense task whose resolution is linked abroad with improvements in artillery systems. The low values for the coefficient of effective area of scatter (less than 0.1 to 0.3 square meters) and flight at low and extremely low altitudes create significant difficulties in detecting these targets. However, as the foreign press points out, destroying unmanned drones presents even greater difficulties.

It is also noted that comparison of the cost of an unmanned drone and a SAM prevents extensive use of SAM's to resolve this task. Therefore, given the greater effectiveness of artillery fire as the result of improvements in fire control and munitions, in the opinion of Western experts, artillery systems will be able to be used used more extensively for dealing with unmanned drones also.

Artillery systems and systems with a combination of missile and artillery weapons have recently been attracting the attention of foreign military experts precisely because the two systems can be combined. In a number of the capitalist countries these kinds of artillery weapons are already being developed. Thus, the SKYGUARD ASPID system has gone into service with the Italian land forces. This consists of an ASPID SAM launcher and GDF-001 twin-barreled 35-millimeter antiaircraft artillery system, together with the SKYGUARD fire control system. The latter includes a target-acquisition and tracking radar for airborne targets, with a range of 19 kilometers and 15 kilometers respectively, a television tracking system, a CORA-2MB digital computer, and indication and control organs. The SKYGUARD equipment is mounted on a two-wheeled trailer. The radar antenna is mounted on the roof of the cabin. The launcher (four missiles in a container), the target-illumination transmitter and the operator's cabin are also in the trailer. The launcher can be controlled automatically by the SKYGUARD system or manually from the operator's cabin. A semiactive radar is used as the target seeker for the ASPID SAM.

In the United States General Electric is developing the BLAZER two-seater turret with combined artillery weapons: the GAU-12 rapid-fire five-barreled 25-millimeter automatic cannon, four STINGER SAM's and launchers with two of the Swedish RBS-70 (laser-guided) SAM's. The fire control system includes a target-acquisition radar for airborne targets and target designation, an automatic tracking sight for airborne targets (with a television channel) and an optical sight with a laser range finder. A test model of the turret has been mounted on the BRADLEY M2 infantry fighting vehicle (instead of the armored turret with weapons), although tracked or other wheeled chassis and other armored vehicles can also be used.

In the opinion of foreign specialists, an important role in improving the capabilities of land forces in dealing with low-flying targets is assigned to

automated control systems for troop air defense assets, and these are now being developed in a number of capitalist countries. Thus, in the FRG an automated control system designated HFLaAFueSysis being developed for the army corps (for the ROLAND-2 and the GEPARD). It will include two-coordinate (TUeR) and three-coordinate (LUeR) mobile radars (in combat use these antennas will be raised to heights of 10 and 12 meters respectively), mobile control posts and data transmitters.

According to reports in the foreign press, in the U.S. land forces command considerable attention has lately been given to developing effective means for dealing with low-flying targets and developing more advanced automated control systems for troop air defense. It is noted that it links equipping the troops with these capabilities and systems with the results from the FAADS program (Forward Area Air Defense System), which envisages development of the following air defense systems:

--a SAM system designed to destroy targets outside the zone of immediate visibility. It is planned to mount a television camera on the missile in this system. The operator will be able to fire a missile at a target using images thus obtained, which will be transmitted to the launch complex along fiber optic cable;

--a SAM or antiaircraft system combining missiles and artillery weapons, designed for use in the main region of a division defense. The ADATS, RAPIER, ROLAND-2, BLAZER and other systems are being considered as possible versions of air defense facilities of this type;

--a light SAM (like the AVENGER) with STINGER missiles, designed for use in the rear region of a division defense.

According to the figures cited in the foreign press, the number of such systems will be 18, 36 and 36 respectively in each U.S. division.

The FAADS program also provides for the development of ground-based and airborne facilities for detecting low-flying targets, and their deployment will enhance the capabilities of automated control system for division air defense under the SHORAD C2 program. In addition it is planned to develop antihelicopter shells equipped with radar fuses for artillery weapons on tanks, infantry fighting vehicles and reconnaissance helicopters, and also to equip combat helicopters with air-to-air missiles.

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GREAT BRITAIN'S AIR FORCE

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 3, Mar 87
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[Article by Col V. Artemyev: "Great Britain's Air Force"]

[Text] As an active participant in the aggressive NATO bloc Great Britain is constantly building up the might of its Air Force, which, in the opinion of foreign experts, is one of the leading air forces among the capitalist states of West Europe. The country's military leadership assigns it an important place in its far-reaching plans and envisages active measures aimed at further building up the combat might of the Air Force by equipping units and subunits with the latest aircraft and weapons, improving its organizational structure and enhancing the quality of combat training and improving rear services.

In line with the NATO plans repeatedly described by the Western press, Great Britain's resources are earmarked for air operations using both conventional and nuclear weapons. Their main mission is to provide the necessary air support both for the land forces and navy of their own country and for bloc allies in the various theaters of military operations, first and foremost Central Europe and the eastern Atlantic. Air defense resources are responsible for defending the territory of Great Britain. In the opinion of NATO experts, in a tense situation and in wartime Great Britain will become a transit point for troops from the United States and Canada moved to Europe, and in a future war it will also be a base for supplying and providing support for combat actions by troops in the European theaters.

Great Britain's efforts within the NATO framework have been focused in three main regions, namely the eastern Atlantic and the English Channel, where a major grouping of combat-ready forces are concentrated, and Central Europe, where the main body of the bloc's strike forces is held.

According to Western press reports, some of the British Air Force formations and units stationed in the homeland are included in the strategic reserves of the NATO joint armed forces Europe command while others have been assigned to reinforce British troops stationed in the FRG, and also allied troops in the North European theater of military operations. The remaining resources are earmarked for action in regions of the eastern Atlantic and the English Channel.

In recent years reorganizational measures have been carried out in the British

Air Force and in the armed forces in general. The Western press notes that the chief of these have been related to abolishing the departments for the branches of the armed forces, including for the Air Force, and setting up a single management organ in which all branches of the armed forces are represented. According to the views of British military experts, this has made it possible to reduce the number of central management organs and the number of personnel and make leadership and planning more immediate. In addition, No 38 Group in the Air Force has been disbanded. Its men and equipment have been included operationally in No 1 Group. Other steps have also been taken to improve the structure of air forces.

The figures presented below on the organization, composition, combat training and development prospects for the British Air Force are based on information published in the foreign press.

Organization and Combat Makeup.

The Air Force has two combat commands, namely, the Air Force in Britain (often referred to as the British Air Force in the homeland) and the British Air Force in the FRG, and also a rear command. They are all under the direct command of the Air Force Supreme Command. The latter is responsible for developing this branch of the armed forces, drawing up plans for the use of the Air Force in wartime, and organizing and conducting combat training for units and their material-technical supply, and also for training of aircrews and technical personnel.

The Air Force Command in Great Britain.

The command, located in High Wycombe, has at its disposal the resources for conducting combat actions both independently and jointly with allied forces in order to provide air defense for the country's territory and adjacent regions (the NATO air defense zone in the Atlantic), and support land and naval forces. Structurally the command is part of the NATO Joint Armed Forces Supreme Command in Europe even though its resources are located in the homeland. It includes three Air Groups (Nos 1, 11 and 18) and also independent units and subunits based on territories overseas in the Falklands (Malvinas), Cyprus, Hongkong and Belize. Each group includes Air Force stations with the Air Force squadrons stationed there, as follows:

No 1 Air Group (headquarters in Upavon) includes the following units and subunits:

--Honington Air Force Station: No 9 Combat Squadron and No 45 Combat Training Squadron for the Tornado-GR1 tactical fighter. The latter is the part of the combat training center (22 aircraft).

--Mareham: No 27 Squadron and No 617 Squadron with the Tornado-GR1; No 55 Squadron with the Victor-K2 tankers and No 232 Combat Training Squadron (the Victor-K2).

--Coltishall: Nos 6 and 54 Tactical Fighter Squadrons and No 41 Reconnaissance Squadron (all equipped with the Jaguar-GR1).

--Wittering: Nos 1 and 233 Tactical Training Fighter Squadrons with the Harrier-GR3.

--Brize Norton: No 10 Squadron equipped with the VC-10 strategic transport aircraft, No 101 Squadron with the VC-10K2 tankers, No 216 Squadron with the Tristar-K1 tankers, and No 241 Combat Training Squadron (VC-10's).

--Lyneham: Nos 24, 30, 47 and 70 transport squadrons and No 242 Training Squadron (all equipped with the Hercules-C1 and Hercules-C3).

--Cottismore: a joint aircrew training center for the Tornado (made up of one squadron (23 aircraft) from the British Air Force).

--Lossiemouth: No 226 Tactical Fighter Training Squadron for Jaguar aircraft.

--Northolt: No 32 Liaison Squadron (the Andover-C1, the HS-125 and the Gazelle helicopter).

--Benson: No 155 Electronic Combat Squadron (the Andover-E3 used to calibrate radiotechnical facilities), the Queen's Flight (Andover-CC2's and Wessex-HC4 helicopters used to carry members of the royal family and other government VIP's and foreign guests).

--(Browdie): Nos 79 and 234 squadrons of the No 1 Combat Training Center, equipped with the Hawk jet trainer,

--(Chevenor): Nos 63 and 151 squadrons of the No 2 Training Center, equipped with Hawk's.

--Aldegrove: No 72 Squadron equipped with the Wessex-HC2 transport helicopter.

No 11 Fighter Group (headquarters at Stanmore);

--(Beanbrook) Air Force Station: Nos 5 and 11 squadrons and a training subunit for the Lightning-F6 fighter-interceptors;

--Luchars: Nos 43 and 111 fighter squadrons equipped with the Phantom-FG1 and FGR2, No 228 Training Squadron for the Phantom-FGR2 and No 27 Squadron equipped with the RAPIER SAM.

--Wattisham: Nos 56 and 74 squadrons equipped with the Phantom-FGR2.

--Coningsby: No 29 Squadron equipped with the Phantom-FGR2 fighter and No 229 Training Squadron for the Tornado-F2.

--Lossiemouth: No 8 Squadron equipped with the Shackleton-AEW2 long-range radar detection aircraft and No 48 Squadron equipped with the RAPIER SAM.

--(Whyton): No 25 Squadron equipped with the BLOODHOUND-2 SAM (with detachments based at Barkstown Heath, (Whyton) and Wattisham.

--West Rainham: No 85 Squadron equipped with the BLOODHOUND-2 (with detachments based at North (Coutts) and (Bowdsie) in addition to West Rainham.

No 18 Coastal Group:

--Lossiemouth Air Force Station: Nos 12 and 208 squadrons and No 337 Training Squadron equipped with the Buccaneer-S2 light bomber.

--Kinloss: Nos 120, 201 and 206 squadrons equipped with Nimrod-MR2 coastal patrol aircraft.

--Saint Mawgan: No 42 Squadron and No 236 Training Squadron for the Nimrod-MR2 coastal patrol aircraft.

--(Finningly): Nos 22 and 202 air-sea rescue squadrons (equipped with specially modified Wessex-HC2 and Sea King-HAR3 helicopters). Wings of these squadrons operate from nine airfields ((Chevenor), Luchars, (Valley), (Leconfield), Manston, (Bowlmer), (Browdie), Coltishall and Lossiemouth).

--(Whyton): No 51 Electronic Combat Squadron equipped with the Nimrod-R1 radiotechnical intelligence-gathering aircraft, No 100 Towing Squadron, No 360 Electronic Combat Squadron, and No 231 Training Squadron (all equipped with various versions of the Canberra).

Units of formations on other territories:

--On the Falkland Islands: No 23 tactical Fighter squadron (the Phantom-FGR2), No 1312 Detachment equipped with the Hercules-C1K tankers and No 1564 Wing equipped with Sea King-HAR3 helicopters, and No 1310 Wing with the Chinook-HC1 helicopter (No 78 Helicopter squadron was recently formed from the last two named wings.

--In Hongkong (the Sek Kong airfield): No 28 Squadron equipped with Wessex-HC2 helicopters.

--In the Near East (the Akrotiri base on Cyprus): No 84 Squadron equipped with Wessex-HU2C helicopters.

--In Belize: No 1417 Tactical Fighter Wing equipped with the Harrier-GR3 and No 1563 Wing equipped with the Puma-HC1 helicopter.

The British Air Force Command in the FRG (headquarters at Rheindalen) is designed for actions in the Central European theater of military operations as part of the NATO air forces No 2 Joint Tactical Air Force Command. It includes 11 combat squadrons, one liaison squadron, two squadrons of transport helicopters and four RAPIER SAM squadrons, as follows:

--Nos 3 and 4 tactical fighter squadrons equipped with the Harrier-GR3 (Guetersloh Air Base).

--Nos 14, 17 and 31 squadron equipped with the Tornado-GR1 and Jaguar-GR1 (Brueggen).

--Nos 15, 16 and 20 tactical fighter squadrons equipped with the Tornado-GR1 and No 2 Squadron equipped with the reconnaissance version of the Jaguar-GR1 (Laarbrug);

--Nos 19 and 92 squadrons equipped with the Phantom-FGR2 air defense aircraft (Wildenrath).

--No 60 Squadron equipped with the Pembroke liaison aircraft (Wildenrath).

--Nos 18 and 230 squadrons equipped with the Chinook-HC1 and Puma-HC1 helicopters (Guetersloh).

--Nos 16, 26, 37 and 63 RAPIER SAM squadrons (at Wildenrath, (Laarbrug), Brueggen and Guetersloh respectively).

Rear Command.

The rear command is responsible for material-technical supply to the country's Air Force units and subunits, organizing communications, training for aircrew and technical personnel, and maintenance of weapons systems and maintaining them in operational condition. The command includes a main center for material-technical supply, specialized material-technical supply units and peripheral organs, a communications headquarters, training establishments and training centers for the country's air force personnel.

The main material-supply center (located at Hendon) is the central organ that coordinates deliveries of material-technical supplies for Air Force units and subunits. It is equipped with an automated supply inventory-control system that links together up to 600 data input devices located in two special material-technical supply units and in peripheral organs--about 100 Air Force stations (bases) and supply points.

The specialized material-technical supply units (at Carlisle and Stafford) are made up of subunits that keep accounts for material-technical supplies and equipment and collect requests from consumers, and subunits for technical servicing and repair, warehousing and the issue of spares and equipment. In addition, they include a supply wing for forward airfields and a motor squadron that delivers material-technical supplies.

The repair units (Saint Athan, Kemble and Abingdon) carry out repairs on aircraft and provide warehousing for them, and No 431 Unit (in Brueggen) is responsible for servicing combat aircraft in the Air Force command in the FRG.

Training Establishments and Centers. Training for aircrew and technical personnel for the British Air Force is carried out at six flying schools (Nos 1, 2, 4, 6 and 7 and the Central Flying School) and three technical schools (Nos 1, 2 and 4), in Air Force and staff colleges, two combat training centers (Nos 1 and 2), a training center for a "ground defense regiment" and the

Central Air Traffic Control School, and also in 16 university squadrons and the cadet corps.

No 1 Flying School (at Linton) provides initial flight training for individuals entering the Air Force without preliminary training in the university squadrons. It is equipped with Jet Provost-T3 and T5 aircraft. The training course lasts 36 weeks. Each person on the course logs 60 flying hours.

No 2 Flying School (Shoebury) trains aircrew personnel for helicopter units and subunits. It is equipped with the Gazelle-HT3 and Wessex-HC2 helicopters. Training lasts 20 weeks with 90 flying hours logged. Upon graduation students are assigned to No 240 Combat Training Squadron (Chinook-HC1 and Puma-HC1 helicopters at the Odiham Air Force Station) or to a search-and-rescue training subunit.

No 4 Flying School (Valley)) is equipped with three squadrons of Hawk-T1's. Aircrews learn to fly at high speed and low altitudes during their basic training course.

No 6 Flying School (Finningly) is equipped with the Domini-T1, the Jet Provost-T5 and the Jetstream-Y1. In addition to pilots, navigators, flight engineers and other crew members are trained on these multiseaters.

No 7 Flying School (Church Fenton) trains an additional contingent of pilots on initial flight training programs. It has two squadrons of the Jet Provost-T3 and T5.

The Central Flying School (Cranwell) trains instructors. Its subunits are equipped with the Bulldog-T1, Jet Provost-T3 and T5 (Scampton), the Hawk-T1 ((Valley)) aircraft and the Gazelle-HT3 helicopter (Shoebury). It is also the base of the Red Arrow exhibition squadron equipped with the Hawk-T1 (Scampton).

No 1 Technical School (Halton), No 2 Technical School (Cosford) and No 4 Technical School (Saint Athan) train junior technical personnel (technicians, mechanics, fitters and so forth) in various aviation specialties. They also include the command radio school where personnel learn to service and repair aviation (ground and airborne) electronic equipment.

The Air Force College (at Cranwell, equipped with the Jet Provost-T5) provides initial flight training for students who have previously acquired flying skills in the cadet corps and university squadrons. The training course lasts 28 weeks and students log an average of 75 hours flying time. After this pilots are assigned to Air Force training establishments (or centers) for basic and advanced training.

The staff college is the main higher military training establishment for training command personnel for the Air Force (up to the level of squadron leader and others of equivalent rank).

The combat training centers (No 1 at (Browdie) and No 2 at (Chevenor)) give aircrews practical bombing training, fire training and other kinds of combat use for aircraft and helicopters during the final stage of their training before assignment to line units. The centers are equipped with various versions of the Hawk combat trainer. If required, that is in a period of threat or during the course of combat actions, it is planned to deploy four combat squadrons at these centers, drawn from the aircraft inventory and using the instructors and best trained students from the No 1 Center for Nos 79 and 243 squadrons, and from the No 2 Center for Nos 63 and 151 squadrons. These four so-called "shadow squadrons" are earmarked for carrying out the following main combat tasks: defense of targets against enemy low-altitude air raids, carrying out aerial reconnaissance and dealing with surface targets in the waters surrounding the British Isles.

The training center for the "ground defense regiment" trains personnel for defense subunits at airfields and as crew members for RAPIER antiaircraft missile complexes and for the military police, who insure order at air bases and other Air Force installations.

The Central Air Traffic Control School (at Shoebury) trains air traffic controllers and other air traffic control specialists. At the school they study theory and learn certain practical skills in organization and the means and methods for controlling air traffic in the vicinity of airfields and along routes and in specified regions of airspace. In addition to the ground equipment needed for this training the school also has Jet Provost-4's.

In addition, 16 training squadrons have been set up mainly at the country's advanced training centers--the so-called university squadrons--for initial training of Air Force candidates. They are all equipped with the Bulldog-T1 trainers and are located at air bases, airfields, air ports and landing sites in the immediate vicinity of the advanced training centers, in particular at Luchars, Cosford, Filton, Tiversham, Turnhouse, Newton, Abbotis [possibly Newton Abbot--ed], Woodvale, Abingdon, Leeming, Finningly and so forth.

The cadet corps mentioned above is used extensively to attract young people into the Air Force. It is a countrywide Air Force organization (with headquarters at Newton) that includes 13 separate Air Force subunits (wings and detachments) equipped with the Chipmunk-T10 and the Bulldog-T1 aircraft, and up to 30 gliding schools and other organizations.

The foreign press states that in all Great Britain's Air Force numbers about 100 squadrons, including 16 fighterg-bomber squadrons, 9 fighter (air defense) squadrons, 7 reconnaissance squadrons (including 4 coastal patrol squadrons), 7 transport squadrons, 3 tanker refuelling squadrons, 14 combat training squadrons, 7 helicopter squadrons, and 11 surface-to-air missile squadrons. They are made up of almost 1,300 aircraft and helicopters of various types (including reserve aircraft) and 136 SAM launchers (including 64 BLOODHOUND-2 surface-to-air guided missile launchers and 72 RAPIER SAM launchers).

When considering the British Air Force's aircraft inventory the Western press notes that a good half of it consists of combat aircraft (more than 600), including about 200 of the latest Tornado-GR1 tactical fighters and the

Tornado-F2A air defense fighter, more than 120 Phantom multirole tactical fighters, almost 120 Jaguar fighter-bombers, and 53 Harrier VTOL tactical fighters. The personnel strength of the Air Force is more than 93,000.

Development of the Air Force.

The foreign press notes that Great Britain's military leadership is implementing a number of measures to further build up the combat might and increase the combat readiness of the Air Force. Most attention is being paid to improving the aircraft inventory and bringing more effective weapons systems into service. To this end, the obsolete Jaguar fighter-bombers are being replaced by the new Tornado-GR1 combat aircraft (the Air Force has ordered 220 of these aircraft), designed mainly for making strikes against targets deep in the enemy defenses, and also for carrying missions to isolate regions of combat activity. The equipment and weapons on the Tornado-GR1 enable it to operate at low and very low altitudes under conditions of limited visibility. The aircraft is equipped with active and passive capabilities to jam enemy air defense systems. It can carry both guided and unguided air-to-ground missiles, including the MAVERICK guided missile, BL.755 bomb canisters and so forth. The aircraft is equipped with two underslung AIM-9L guided missiles for protection against fighters, and the Mauser 27-millimeter cannons that it carries can also be used.

It is also planned to use the Tornado-GR1 to attack surface ships. For this mission it is intended to equip it with SEA EAGLE antiship missiles.

It is planned to build 165 fighter-interceptor versions of the Tornado for air defense in the late Eighties and replace the Phantom's and Lightnings. In addition, it is intended to equip some of the above-mentioned Tornado-GR1's with reconnaissance equipment so that they can also be used as a strike version, and to reequip two squadrons with them (which now have Jaguar-CR1 reconnaissance aircraft).

At the same time, Great Britain's Air Force command intends to keep most of the Jaguars and Buccaneers thus replaced in service through the mid-Nineties. To this end it is planned to modernize about 100 Jaguars and 50 Buccaneers. The latter will be refitted to carry the SEA EAGLE antiship missile.

In accordance with an agreement between the United States and Great Britain, development work is being done on a new VTOL or VSTOL tactical fighter based on the Harrier aircraft; in the British Air Force this has been designated the Harrier-GR5. It is planned to acquire 60 of these aircraft to replace the Harrier-GR3. In contrast to the American AV-8B, which has six suspension points, the Harrier-GR5 has eight (including two for the SIDEWINDER missile). The aircraft will be equipped with infrared reconnaissance gear and an onboard electronic combat system that includes a receiver that provides warning when enemy radars light up the aircraft and an active jamming station. Later it is intended to acquire another 40 of these aircraft.

In order to augment the long-range radar and control command (the NATO AWACS command) developed within the NATO framework, which has 18 U.S.-built E-3A's, steps are being taken by Great Britain to develop its own AWACS capability.

To this end it is planned to refit 11 Nimrod-MR1 coastal patrol aircraft as the Nimrod-AEW3 long-range radar detection aircraft. This work, however, has been very protracted. British experts have been unable to develop the onboard radars needed for them. Accordingly, the question of acquiring the U.S. E-3A long-range radar detection and control (six to eight aircraft) is now under consideration. Meanwhile, the Shackleton-AEW2 long-range radar detection aircraft now in service with the British Air Force are being modernized in order to extend their service.

Judging from the reports in the foreign press, the Victor-K2's will be withdrawn from service by the late Eighties when they reach the end of their service life. Great Britain's Air Force command has therefore started to augment the tanker inventory by retrofiting VC-10 and Tristar transport aircraft as tankers. For this purpose 23 passenger versions of the VC-10 and six Tristars have been acquired and are being modified as VC-10.K2 (K3) and Tristar-K3 tankers. In addition, in order to augment the six existing tankers based on the C-130 Hercules military transports, it is planned to refit another four of them.

Taking into account the experience gained in combat actions in the war against Argentina over the Falkland Islands (Malvinas), other aircraft in service with the British Air Force are also being modernized. In particular, more up-to-date onboard equipment is being fitted on the Nimrod-MR1 and MR2 coastal patrol aircraft. They are being fitted with the SIDEWINDER air-to-air guided missile and HARPOON antiship missiles.

In the longer term, work is being done in Great Britain to develop a new combat aircraft for the Nineties that can be used both as an air defense fighter and a fighter-bomber. It is planned to order about 250 of these aircraft to replace the Phantom and Jaguar tactical fighters now in service.

Simultaneously with the modernization of the aircraft inventory Great Britain's Air Force command is making considerable efforts to develop new weapons systems for aircraft. Air-to-air guided missiles, rocket munitions, aerial bombs and so forth are under development. As new equipment goes into service the organizational structure of the Air Force is being improved, along with the system of combat training for units and subunits. This all once again testifies to Great Britain's firm allegiance to the aggressive course of the NATO bloc and its continuing preparations for war against the USSR and the other countries of the socialist community.

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SWEDEN'S 'GRIPEN' TACTICAL FIGHTER

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 3, Mar 87
(signed to press 5 Mar 87) pp 40-43

[Article by Lt Col V. Kuzmin: "Sweden's Gripen Tactical Fighter"]

[Text] Sweden's military-political leadership, which has traditionally pursued a policy of noninvolvement in military blocs, nevertheless thinks that a strong national defense is a very important factor in guaranteeing the country's neutrality. Because of this it pays constant attention to enhancing the combat capabilities of its air force by equipping it with the latest aircraft. Sweden is at present continuing the development initiated in 1982 of a new-generation multirole tactical fighter known as the JAS-39 Gripen (JAS are the initial letters of the Swedish words Jakt, Attack, Spaning, indicating the combat designation of an aircraft, meaning Interception, Attack and Reconnaissance). The foreign press reports that the JAS-39 will be capable of dealing with airborne, ground and maritime targets in all weathers, day or night, and be able to carry out aerial reconnaissance, that is, carry out the combat missions of an air defense fighter, ground-attack aircraft and reconnaissance aircraft. It is also noted that in the Nineties it will replace the Draaken, the Viggen and the Saab-105 now in service. The Gripen fighter is being developed by a group of Swedish firms, namely Saab-Skania (the main contractor), Volvo Flugmotor, Ericsson and FFV. In addition, some firms in the United States, Great Britain, the FRG and France have been involved in order to save time and reduce costs.

The JAS-39 has a monoplane configuration with a mid-section delta wing with cutaway tip, forward-positioned control surfaces and a single-fin tail section. It has tricycle landing gear with the main struts retracted forward and the rear strut backward. The wing has two pairs of elevons (inner and outer) and leading-edge slats. Brake flaps are located in the rear section of the fuselage. The air intakes for the engines are located on both sides of the fuselage on the same level as the cockpit. According to the foreign press, up to 30 percent of the aircraft's structures, including the wing, tail fin, leading-edge control surfaces, air intakes ad undercarriage struts are made from composite materials, and this has made it possible to reduce its weight 25 percent. In line with the requirements, normal takeoff weight should be 8,000 kilograms, and maximum speed without external stores about 2,000 kph (at altitude) and 1,200 kph (at sea level). The fighter is 14 meters long and has a wing span of 8 meters. It has a one-man crew but work has already started on a two-seater version for which an order is expected in

1987.

It is planned to use the RM12 low-ratio (0.28) bypass turbojet, a modification of the American F404-GE-400 turbojet as the power plant. The RM12 is being developed and will be produced by the Swedish firm Volvo Flugmotor and the American General Electric. Compared with the U.S. engine it has 10 percent more thrust with afterburner (8,200 kilogram force with a fuel consumption rate of 1.8 kg/kg per hour). This is achieved by increasing compressor pressure to 27 and the combustion chamber temperature and using materials possessing improved characteristics in the turbine and reheat chamber, and also by altering the blade control program in the alignment gear in the first stage of the compressor. In order to enhance reliability in the RM12 it is fitted with a backup starting system and diagnostics for monitoring operation. In addition, the forward compressor mounting is being strengthened to enable it to withstand shock loads occurring in flight when birds with a mass up to 0.5 kilograms are ingested into the engine. The RM12 weighs 1,050 kilograms.

Since June 1984 in the United States and since January 1985 in Sweden a ground testing program has been in progress for the RM12, to a total of 5,500 hours running time. According to the Western press tests are now being conducted at the Volvo Flugmotor factory on five prototypes of the engine, which by April 1986 had already been run for 1,400 hours. Flight tests are planned for the first half of 1987 and a decision on whether to go into series production is expected in late 1987. It is thought that by that time the prototypes will have logged 3,800 hours. Swedish experts think that by 1990 maximum engine thrust will have been increased 20 percent and by 1995 some 35 percent compared with the thrust developed by the F404-GE-400.

The Gripen aircraft is equipped with up-to-date electronic equipment based on the Swedish SDS80 central computer, which will be used with software using ADA and PASCAL languages. A multifunction pulse-Doppler radar operating in the 3-centimeter range is being developed jointly by the Swedish Ericsson firm and Ferranti of England. It is thought that thanks to digital processing of signals with the aid of a programmable microprocessor the radar will enable the aircraft to fire at ground, sea and airborne targets, provide a terrain-following capability in flight and scan the ground with a high degree of resolution for reconnaissance purposes. The pilot will be able to select operating modes for the radar. According to Swedish specialists, compared with the radar in the Viggen fighter, the new radar will be three times as effective but the size of the antenna will be reduced 40 -percent thanks to the use miniaturized electronic components and a movable carbon plastic phased-array slot antenna developed by Ferranti. The first test model of the radar is now undergoing bench testing.

In order to attack ground targets and carry out reconnaissance at night it is planned to include in the onboard sighting and navigational equipment a forward-looking infrared station with automatic target acquisition and tracking facilities. It will be mounted in an external pod beneath the right air intake. An electro-optical indicator with an enlarged field of view (30 X 20 degrees) and three combined CRT scanning display units with a screen measuring 120 X 150 mm, all from the American Hughes firm, will be mounted in the cabin. The left display will show flight data (including an artificial

horizon, speed and altitude, and approach and landing data); the center display will present a moving map of the terrain, stored in digital form in a memory device; and the one on the right will indicate the tactical situation, with data on targets acquired by the radar and the infrared station.

The Gripen fighter will be equipped with an electronic remote digital flight control system with three levels of redundancy (no provision is made for mechanical backup), developed by the American firm Lear Siegler. It will include three main digital computers and three analog backup computers. It is reported that tests have already been started on a specially equipped Viggen.

The JAS-39 will be equipped with the H-423 laser-based inertial navigation system made by the American form Honeywell, including, in particular, a computer (860,000 operations per second) with a storage capacity of about 66,000 words. The AMR-345 UHF radio from the Swedish firm Bofors, with push-button selection and built-in microprocessor, has 500 preset channels.

The aircraft has four suspension points beneath the wings and two points at the tips of the outboard wing (for air-to-air missiles). In addition, a 27-millimeter Mauser cannon is mounted in the fuselage. Provision is also made for the use of reconnaissance equipment and electronic combat gear.

The foreign press notes that the first of five prototypes planned for the JAS-39 is now being assembled. Three sets of wings for them are being built by the English firm British Aerospace, after which the production technology will be transferred to Sweden. More than a dozen stands have been built for ground tests of the fighter's systems, three series of wind-tunnel tests have been conducted, and several forward parts of the fuselage have been built for strength testing in the event of bird ingestion and to check the ejection system.

The Swedish Air Force command proposes to build 140 Gripens. Flight testing is to begin in 1987 and the aircraft is to go into service in 1992. The total cost of the development and purchase programs for the aircraft is about $4 billion according to Western experts.

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FRENCH GUIDED AVIATION WEAPONS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 3, Mar 87
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[Article by Col V. Dmitriyev: "French Guided Aviation Weapons"]

[Text] The present level in the development of science and technology and the war industry in France, and also the policy pursued by France of independently developing and producing its weapons has, according to the Western press, provide the country's Air Force with virtually all kinds of aviation weapons developed right there in France. In the late Seventies and early Eighties a number of new models were adopted, resulting in virtually a complete replacement of the arsenal of the main types of guided aviation weapons developed in the Sixties. In the opinion of French military experts, this has made it possible to improve and extend the combat capabilities of the Air Force and bring them up to a modern level, and also to take into account the requirements for the immediate future and through the Nineties.

In the class of aviation weapons designed to destroy ground and maritime targets, during the above-mentioned period the weapons going into service included models such as the EXOCET AM-39 and AS-30AL antiship missile and the ARMAT antiradar guided missile, which is to replace the MARTEL AJ-37. During 1982-1984 the obsolete guided aerial bomb with a television guidance system that had limited combat applications (only in daylight or when used with flare bombs) was replaced by the new BGL series of guided aerial bombs. This series also includes the (ARCOL) guided aerial bomb, designed especially to destroy strongly fortified installations. A new charge is being developed for the BELUGA BLG-66 unguided cluster bomb, increasing its combat effectiveness and capabilities, and in the late Eighties a guided cluster bomb with various kinds of fillings is expected to go into service.

The class of weapons used to deal with airborne targets has been augmented by the R.530F and R.530D SUPER MATRA medium-range guided missile and the Magic-2 close air combat missile, and the AATCP guided missile is being developed especially for helicopters.

Information on the design features and combat capabilities of some of the most extensively used models of present and future tactical guided weapons for the

French Air Force and Navy is given below (basic characteristics are shown in tables 1 and 2).

Table 1. Main Characteristics of French Aviation Guided Missiles

Designation and mark, date went into service	Launch weight kg	Weight of warhead kg	Maximum range km	Accuracy (C.E.P.) m	Range of altitude m	Guidance system
Air-to-Ship and Air-to-Ground Guided Missiles						
EXOCET AM-39, 1979	650	150	70	5	-	inertial and active radar
AS-30L, 1965	380	110	10	5	-	radio command
AS-30AL, 1983	520	240	16	3	-	semiactive laser
MARTEL AJ-37, 1969	520	150	60	5	-	passive radar
ARMAT, 1987	530	150	100	5	to 12,000	passive radar
Air-to-Air Guided Missiles						
MAGIC R550 1974	90	12	7	-	to 15,000	infrared
MAGIC-2 1984	90	12	15	-	to 20,000	infrared
SUPER MATRA R530F, 1979	250	30	35	-	to 27,000	semiactive radar
SUPER MATRA R530D, 1986	250	30	50	-	to 27,000	semiactive radar
AATCP, 1987	17	3	6	-	-	infrared
MICA, early 90's	100	-	60	-	to 27,000	inertial and active radar or infrared

* * * * *

Air-to-Ground and Air-to-Ship Guided Weapons.

The AM-39 EXOCET antiship missile is an airborne version of the EXOCET family of guided missiles and is designed for all-weather day and night use against medium-sized and large surface ships. This antiship missile utilizes a Table

2. Main Characteristics of French Guided Aerial Bombs

Designation and mark, date went into service	Weight, kg total / warhead	Maximum range km	Filling	Combat use alt. m	speed Mach	Combat effectiveness
BGL series 1982-1984	250-1000 / 100-500	8	HE	to 100	M0.9	C.E.P. = 2 m
ACROL, 1986	1000 / about 300	-	hollow-charge HE	-	-	-
APACHE*, late 80's	1000-1150 / 800	20	small-caliber bombs and mines	50-10,000	M0.9	area of destruction 300 X 1000 meters

* = guided aviation canister

* * * * *

combined guidance system in which inertial gear with a radio altimeter guides the missile along its flight path according to a set program while the terminal phase uses an active radar target seeker. At a distance of about 12 kilometers the target seeker locks on to the target and takes over missile guidance, from which point on control of the antiship missile is handled by the target seeker. The missile's subsonic speed is achieved initially by a solid-fuel launch booster and then by a solid-fuel rocket engine, and, depending on the state of the sea, it flies at one of three heights (2, 4 or 7 meters), maintained with the aid of a radio altimeter. Target destruction is effected by the armor-piercing HE warhead. The foreign press reports that the EXOCET showed a quite high degree of combat effectiveness during the Anglo-Argentine conflict over the Falkland Islands (Malvinas).

The AS-30AL guided missile was developed from the AS-30L to destroy small ground and maritime targets. The missile has a normal aerodynamic configuration and is equipped with a semiactive laser homing head and a booster and sustainer to maintain subsonic speed. Two types of warhead may be used on this guided missile, HE fragmentation (for ground targets) or armor-piercing (for maritime targets).

The ARMAT antiradar guided missile is designed to destroy troop radars in active mode and air defense targets, and is an all-weather day or night weapon. The missile has a normal aerodynamic configuration and is equipped with interchangeable target seekers operating in three different frequency ranges. It has an HE warhead and a booster and a solid-fuel rocket engine. The Western press notes that before the ARMAT is launched on a combat mission it is necessary beforehand to acquire intelligence data on radars based in the area of proposed air force actions. These data are used to select the version of the target seeker used and also to determine optimal flight paths and flight profiles for the aircraft carrying the missile.

The BGL-series guided aerial bombs with semiactive laser guidance use standard 250 to 1,000 kilogram HE bombs and are equipped with a detachable set of gear and an aerodynamic tail module. The guidance module utilizes a wind vane-type target seeker with a two-plane stabilizer. During flight the bomb is guided by two pairs of differential rudders mounted in the forward section with the warhead, and roll stabilization is effected with a gyroscope (for flight according to a program after the bomb has been released). The aerodynamic tail module has a cruciform wing with cantilevers that move after release. In combat the bomb is released in horizontal flight or with the aircraft pitching up.

The 1,000-kg ARCOL guided aerial bomb has the same guidance system and aerodynamic control facilities as the BGL series but its warhead is made up of two charges--a hollow-charge above (about 20 kilograms of explosive) and an HE charge below (about 300 kilograms). The hollow charge is used to add to the kinetic energy of the bomb itself for initial penetration of barriers (runway surfaces, massive supports on large bridges and so forth). The HE charge penetrates the hole made in the barrier after a short delay.

Development of guided cluster weapons is one of today's main avenues in the development of air force weapons abroad. In France work is now underway on the APACHE guided aerial cluster bomb, made structurally from three main components, namely, the forward and tail section and the warhead compartment. The forward section will contain a gyro platform for the inertial guidance system, a radio altimeter, an intervalometer and a power source, and, later, a homing head. The tail section holds the rudders that are deployed after release, and eventually it is planned to mount an engine device there. The warhead compartment can be either a West German or French version. As in the West German MW-1 cluster bomb, the former will contain pipe guides from which small-caliber munitions are ejected at a rate determined by the intervalometer. The other version of the warhead will be filled exclusively with French munitions, including fragmentation bombs and mines for use against infantry.

Air-to-Air Guided Weapons.

The R.530F SUPER MATRA medium-range guided missile is designed for use against airborne targets. Structurally it is made with a normal aerodynamic configuration with a small cruciform wing with a thick root chord, providing the missile with good maneuvering characteristics, particularly at high speeds. The missile is equipped with a semiactive radar homing head, a twin-mode solid-fuel rocket engine and a fragmentation warhead. The R.530D is a modified R.530F and is intended for use in aircraft equipped with pulse-Doppler radar, which, in the opinion of French experts, should improve effectiveness against low-flying targets against the backdrop of the ground. In addition, the R.530D is distinguished by its greater range and immunity against to ECM jamming.

In the near future the MAGIC-2 guided missile will replace the R.550 MAGIC. This missile has a canard configuration with fixed aerodynamic surfaces forward of the rudders (to improve control at high angles of attack) and a nozzle assembly that rotates freely about the tail section. It is equipped

with an infrared target seeker, a fragmentation warhead with a radar proximity fuse and a single-mode solid-fuel rocket engine.

French military experts are of the opinion that because of the growing number of qualitative improvements in the helicopter inventory, in future military conflicts there will inevitably be combat between the helicopters of the opposing sides. Accordingly, development work is now being done on the AATCP special helicopter guided missile for air combat. This is a version based on the MISTRAL air defense missile. According to the design specifications, the AATCP will have a range of 4 to 6 kilometers, a launch weight of 17 kilograms, and will fly at speeds up to Mach 2.6. The body of the missile is 1.8 meters long with a diameter of 90 millimeters. It utilizes a canard aerodynamic configuration and has rudders that deploy after launch. Its multisegment infrared target seeker guides the missile to its target from any launch aspect. The missile is equipped with a fragmentation warhead with an active laser fuse and it has a twin-mode solid-fuel rocket engine. It is proposed to use either a gyrostabilized helicopter sight or a pilot helmet sight for launch.

One promising air force weapon for dealing with airborne targets on which work is being done is the MICA guided missiles, which according to foreign experts it will be possible to use for both medium-range and close air combat. To this end it is proposed that the missile be made using the same scheme as for the R.530F SUPER MATRA but with thrust vector guidance during the initial part of the trajectory, and the rigid mechanical link between gas and aerodynamic rudders will make it possible to fly at high angles of attack. It is also reported that a combined guidance system (internal command and active radar) will provide a capability to intercept airborne targets at medium range, while the all-aspect infrared target seeker will enable close air combat.

In the opinion of foreign experts, at this stage the French Air Force is equipped with a variety of tactical guided missiles for dealing with ground, maritime, and airborne targets and they are being constantly improved in order to maintain the combat capabilities of the Air Force at the level of present-day requirements.

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NAVIGATIONAL AIDS FOR U.S. SUBMARINES IN THE ARCTIC

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 3, 5 Mar 87
(signed to press 5 Mar 87) pp 54-57

[Article by Capt 1st Rank V. Mikhaylov, candidate of military sciences, and Reserve Capt 1st Rank N. Frolov, candidate of technical sciences: "Navigational Aids for U.S. Submarines in the Arctic"]

[Text] The military-political leadership in the United States considers that achieving objectives in modern warfare depends largely on the course of combat actions at sea. It therefore pays great attention to building up the might of the Navy, and also to studying all possible seas and oceans that may become theaters of military operations, particularly the Arctic as an important operational-strategic region in the oceans of the world. In his April 1983 statement President Reagan noted the paramount task of mastering navigation in the Arctic and pointed to the need to combine the efforts of the NATO countries in this matter.

The U.S. Navy's Arctic Research Laboratory located on the coast of Chukchi Sea (Alaska) is the center for research in that region. It is made up of 12 permanent research stations with a permanent staff of about 700 people. They do research in the fields of oceanography, geophysics, the chemistry and biology of the sea, meteorology, hydrology and underwater acoustics, helping to solve problems and applied tasks in the interests of conducting combat operations and the construction and operation of engineering installations, and for marine navigation and maritime practices. A considerable part of the Arctic Ocean is covered year-round with thick pack ice whose depth in winter reaches 3 to 4 meters, and in the summer 1.5 to 2 meters. As a result of ice motion and ice shear, ice hummocks are formed whose lower sections extend 10 to 15 meters beneath the surface of the water, and in some cases as deep as 50 meters. Floating icebergs have even deeper drafts. This all significantly restricts the maneuvering ability of submarines in terms of depth and makes it difficult for them to surface, while surface ships cannot maintain a set course.

The first U.S. nuclear-powered submarine [SSN] to navigate to the North Pole was the NAUTILUS in 1958. Now, according to the foreign press U.S. SSN's have done this kind of thing more than 20 times, and during the course of these cruises have studied the oceanographic, hydrological and hydrographic conditions encountered when sailing there and checked out navigation methods and developed methods for surfacing at the North Pole or in nearby areas.

Single and group exercises for submarines have been conducted and tactical variants have been worked out for engaging in combat actions.

Most of the cruises to the Arctic have been by STURGEON-class SSN's. Military experts in the West note that these submarines have been specially modified to sail in ice. Figure 1 below shows the design features of these SSN's that enable them to cruise in the Arctic. The upper part of the conning tower and the diving planes are reinforced with HY 80/100 steel plates, and outboard devices are equipped with special ice fairings. The diving planes can be moved into the vertical position when the submarine surfaces through the ice. In addition, there is a taxiing device that enables the ship to maneuver in tight situations.

The foreign press notes that the experience gained by the U.S. Navy since the start of activity in the Arctic has revealed the following main defects in the STURGEON-class submarines: constant use of the sonar equipment in active mode in order to insure safety reveals the submarine's position; in the opinion of the Navy leadership, the amount of munitions carried aboard the submarine (mines, torpedoes and HARPOON antiship missiles) limits the combat capabilities of the SSN.

In the early Seventies, when designing and building the first LOS ANGELES-class SSN's--the most numerous in the U.S. Navy--American specialists rejected several of the technical solutions connected with insuring safety when cruising under ice conditions that had been incorporated on the STURGEON-class SSN's. Now, however, according to foreign press material, it is planned to introduce a number of design changes tested during Arctic cruises, in particular, to replace the horizontal diving planes with tumblehome planes mounted in the bow and to reinforce the protection for outboard devices, the forward end and the stern control surfaces.

Starting with SSN719, the PROVIDENCE, in order to increase the combat capability of submarines by a factor of about 1.5, U.S. specialists are planning to equip each submarine with 12 vertical launchers for the TOMAHAWK cruise missile. U.S. specialists think that another weapon suitable for use in the Arctic is the large Mk48 ADCAP torpedo now under development; it is highly reliable, has a high level of ECM immunity and an increased range for the self-guidance system. The modernized torpedo can be used effectively in conditions under the ice and in adverse hydrological conditions and when heavy seas are running.

In the opinion of the U.S. Navy command, the requirements for enhanced combat capabilities for action in the Arctic will be most fully met in the process of developing the new class of SSN's, namely the SSN21. According to the initial design provision has been made to implement various measures including the installation of reinforced forward hydroplanes and stern control surfaces and the use of an improved nuclear power plant, and also the use of a protected screw and torpedo equipment with a larger diameter. Particular attention is being paid to developing special sonar equipment to insure cruising beneath the ice and the detection and classification of targets. Specialists in the

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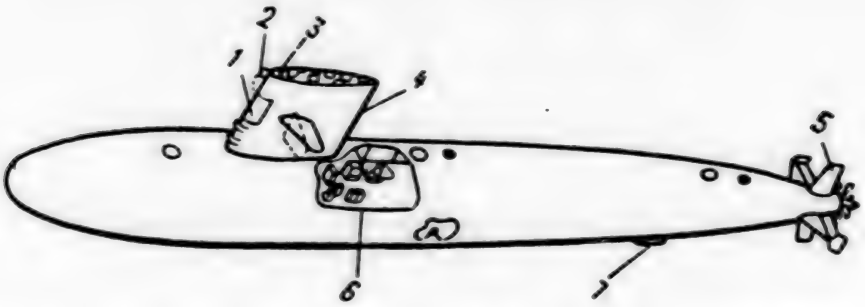

Figure 1. Design Features of the U.S. STURGEON-class SSN's

Key: 1. Antenna for sub-ice navigational sonar
2. Diving planes
3. Ice fairings
4. Reinforced conning tower
5. Reinforced rudder
6. Electronic navigational equipment
7. Taxiing device

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West note that from the standpoint of using sonar equipment, the specific conditions in the Arctic (shallow water, the special features of absorption and reflection of sonar signals, ice melting, ice drift and other factors) hamper accurate prediction of detection range, the trajectories of propagated acoustic signals and zones of acoustic illumination for the various sonar stations. Noises resulting from strong winds, and the impacts and scraping of ice formations encountered increase background levels 5 to 10 decibels compared with the noise level in ice-free seas, and this makes it difficult to resolve tasks concerning the detection and classification of targets found during sonar contacts.

During the first cruise under the ice by the SSN NAUTILUS more than a dozen special sonar devices were used, including ice fathometers that made it possible to make observations in three directions, namely upward, downward and in a hemisphere forward along the course of the submarine. They were designed to determine the thickness of the ice and the distance to its lower edge, and to detect pools of open water and leads in the pack ice. In 1958, in order to insure navigation under the ice and illuminate the situation along the submarine's course, the AN/BQS-8 high-resolution sonar gear was used for the first time. In this equipment there is constant oblique radiation and with the aid of an electronic display an underwater picture was created along the direction of movement. Figure 2 shows the set of sonar equipment installed on the STURGEON-class SSN's.

The foreign press emphasizes that modern submarines are equipped with special sonar equipment that makes it safe for them to cruise in the Arctic at any time and engage in all kinds of activity. For cruising in regions where the ice situation is complex the LOS ANGELES-class SSN's are equipped with the AN/BQS-15 short-range sonar gear designed to detect icebergs and pools of open

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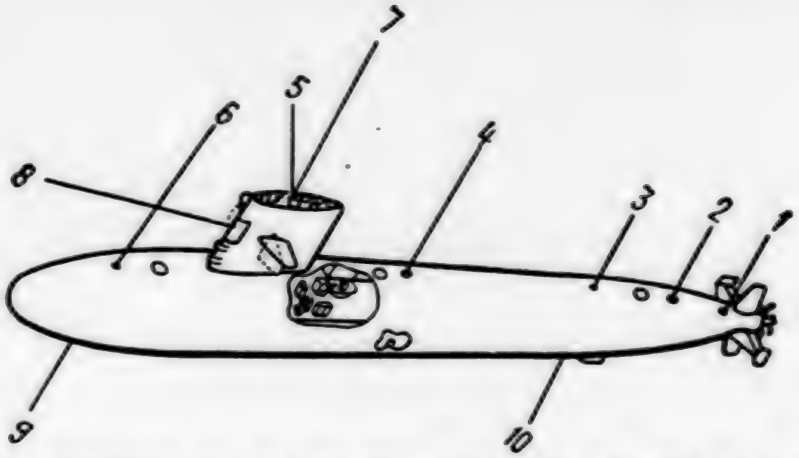

Figure 2. Sonar Equipment on an SSN Enabling It To Cruise in the Arctic

Key: 1 through 6. Emitters on acoustic devices for illuminating the ice conditions in the upper hemisphere and facilities for measuring the thickness of the ice
7. Profilograph vibrators for measuring the thickness of the ice while moving
8. Antenna for sub-ice sonar navigational gear
9. Echo sounder vibrators
10. Antenna for sideways-looking sonar equipment

* * * * *

water and also search for mines. Three of its emitters are mounted on the conning tower reinforcement. Echo signals are received via a cylindrical antenna mounted higher up on the conning tower. When moving beneath the ice, an echo sounder and a profilograph are used to determine the lower edge; the transponders are mounted on the lower and upper parts of the submarine's hull. The modernization program for the AN/BQS-15 sonar equipment envisages development of a computer for data processing and devices to produce narrow-beam radiation.

The U.S. Navy is also developing position sonar gear specifically for this region, in the form of a permanent sonar observation system, and also automatic equipment, namely sonar beacons. It is planned to include in the permanent sonar system an extensive fiber-optic data acquisition and transmission system with a number of hydrophones, a device for transmitting data to a shore-based acoustic research center, a device to monitor the operation of the hydrophones with a data transmission line, and a systolic data processor and fast Fourier transform processor. The system will operate using specially derived data-processing algorithms designed for the operation of technical resources under Arctic conditions.

Sonar beacons that will operate automatically for up to one year will be made in two versions, namely, for use with aircraft (measuring hydrophones on the beacon will penetrate upward through the ice) and with submarines (transmitter antennas on the beacons will penetrate through the ice to the surface).

The first version will consist of apparatus that through kinetic energy is able to penetrate through ice 1.2 to 1.8 meters thick. Its rear section, which contains the transmitter unit, will be held within an ice layer with braking devices while the antenna remains on the surface. After the hydrophones have been set to a specified depth and the power switched on, the beacon is ready for operation.

The second version is a sonobuoy with apparatus mounted in a container that has positive buoyancy. It rises to the lower edge of the ice and when it makes contact with the ice a tube is automatically deployed. This makes a hole in the ice through which a transmitting device with an antenna is pushed to the surface. The Navy command plans to form a boundary line in the Arctic using these beacons.

In addition to the development of sonar devices the United States is also giving a great deal of attention to solving navigation problems using both traditional and nontraditional methods.

Experts in the West include the following in the special features involved in navigation in Arctic regions: the lower guiding force of gyrocompasses, which makes it impossible to use them north of latitude 86 degrees; the closeness of the Earth's magnetic pole, which causes significant magnetic deviation and reduces the vector in the horizontal component of the Earth's magnetism; the substantial daily shift of the magnetic pole and frequent magnetic storms, as the result of which errors of up to 45 degrees are seen in the readings on the magnetic compass; the radio emission absorption effect from the Polar cap, which reduces accuracy by a factor of two or three in determining location from the OMEGA global VLF navigation system; insufficiently detailed maritime navigation maps for regions north of latitude 70 degrees; the frequent presence of strong refraction, fogs, blowing snow and distortion of the line of the horizon by ice and the presence of false horizons.

The OMEGA navigation system is the one used most extensively to determine the location of a ship under Arctic conditions. This system guarantees a fix on position with an accuracy of 2 to 4 miles in any part of the world's oceans. When it is used in differential mode (with the transmission of additional corrections for local conditions affecting the propagation of radio waves) accuracy can be improved to 100 meters. The system makes it possible for a submarine to determine its location at depths down to about 15 meters without surfacing, which is particularly important in order for a submarine to remain hidden.

The most accurate fixes are made with the aid of the U.S. Navy's TRANSIT space navigation system, which provides an accuracy of about 370 meters, and also with the NAVSTAR satellite navigation system in which it is planned to have 18 satellites during the Nineties. Accuracy in determination of location using this system is about 16 meters.

Among the facilities for determining coordinates extensive use is made of shipborne inertial navigation systems. The main thrust in development of these systems is improving their operating accuracy, which increases effectiveness both in the use of onboard weapons and of navigation. In these

systems, which are designed for operation in Arctic conditions, provision is made for automatic switching from the regular Mercator coordinates to a transverse Mercator projection.

In the regions of the Arctic most important from an operational standpoint, the possibility is not excluded of developing reference navigation systems using sonar beacons to make up a network of responder beacons placed at known points and providing a geometry for intersecting lines of position in a given region. American specialists think that by using computers and appropriate software it will be possible to determine location from responder beacons with an accuracy of several meters.

A responder beacon consisting of an anchor, a power source and a container with the electronic equipment and emitter (and antenna) can be set at depths down to 90 meters. After it has been put in place the container with electronic package and emitter floats at a specified depth. These kinds of responder beacons can operate for up to a year. The interrogation signal is transmitted at 7 kilohertz and the response can be on any of 10 preset frequencies. Provision is made in the receiving channel of the beacon for special jamming immunity and tune-out against the harmful effect of reflections from the seabed and from the lower boundary of the ice cover.

According to experts in the West, some use may be made of bathymetric navigation in the Arctic. In this kind of system the location of a ship is determined from the typical depths in the region where the ship is sailing. The advantage of this method is that quite accurate fixes can be made and it does not depend on outside sources for navigational information or the effect of climatic conditions (visibility, the state of the sea and so forth) or geographic conditions (the Earth's magnetic pole and so forth) in the region. However, its practical use requires a detailed knowledge of the depth and the relief of the seabed and the use of a echo sounder in active mode.

To judge from the foreign press, in general the task of navigational support in the Arctic is being resolved comprehensively by improving the facilities available and making use of ground, space and sonar facilities in place, and also by conducting a whole series of work to develop more accurate navigational charts, depth surveys, determination of currents, conditions for the propagation of radio waves, deviations on the magnetic compass and so forth.

Pieces published in the Western press dealing with scientific research programs, the test and design work being done, and the aims and missions of U.S. Navy submarines in the Arctic indicate that they are all directed toward enhancing the combat efficiency of seaborne weapons and technical facilities, and also testify to the purposeful preparations being conducted by the U.S. Navy for aggressive actions in this important region of the world's oceans.

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UNDERWATER ACOUSTO-OPTIC IMAGING SYSTEMS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 3, Mar 87
(signed to press 5 Mar 87) pp 57-59

[Article by Capt 3rd Rank V. Chulkov and Snr Lt A. Skuratovskiy: "Underwater Acoustooptic Imaging Systems"]

[Text] The United States and its allies in the aggressive NATO bloc, and other leading imperialist states are making extensive use of the latest achievements of science and technology for military purposes. This applies in particular to underwater acoustooptic imaging, which is an independent avenue in sonar. According to reports in the foreign press, using underwater acoustooptic imaging systems it is possible to detect and recognize mines against a background of rock, reconnoiter underwater inversion layers and examine various kinds of underwater objects.

The principle on which underwater acoustooptic imaging systems operate is based on the emission of a sonar signal and the reception of signals scattered by underwater objects (targets). The main distinguishing features of underwater acoustooptic imaging systems compared with regular sonar gear is the high angular resolution (0.1 to 2 degrees), which predetermines the need for a large number of spatial receiving channels in the equipment (thousands and tens of thousands), and correction for the curve on the acoustic wavefront resulting from operation in the near zone (the Fresnel zone).

The acoustooptic, holographic and diagram reconstruction methods of underwater acoustooptic imaging are the ones most used. In the acoustooptic method the image is reconstructed from an approaching acoustic field using acoustic lenses, and the operating principle is similar to the optic method. An acoustic lens processes the parameters of signals (using the Fourier method) impinging on its input surface, and the topography of the acoustic pressure, corresponding to an image of the underwater situation, is formed in the focal plane of the lens. With the aid of an acoustically sensitive element (for example, a piezoelectric matrix) this topography is transformed into an electrical signal which is line scanned and displayed on a screen similar to a television screen in the form of an image of the underwater situation. In the holographic method the approaching acoustic field is converted by a matrix antenna made up of a set of piezoelectric transducers into electrical signals from which the hologram is formed. The image is reconstructed from the BLANK PAGE FOR INSERTION OF TABLE 1

Table 1. Main Tactical-Technical Characteristics of Underwater Acoustooptic Imaging Equipment.

Developer, Country	Range / Operating depth	Angle of vision, deg. / Imaging time, sec.	Operating frequenct MHz / Power consumption, kW	Volume of onboard gear, m^3 / weight, kg	Size of outboard gear, mm / weight, kg	Imaging system
Lockheed United States	15.3 / 6000	45 / 1.3	1.0 / 0.35	—	460, 680 [1] / 70	acoustooptic
Naval Maritime Systems Center United States	30 / 3700	11 / 2.0	0.64 / 2.0	0.45 / 200	600×900×460 [2] / 400	holographic
EMI, Creat Britain	10 / 300	18 / 0.04	2.0 / 0.2	0.028 / 15	420, 1000 [1] / 40	acoustooptic
OKI Electric Industry, Japan	100 / 100	40 / 2.0 at a range of up to 30 meters	0.2 / 2.5	1.27 / 350	1000×1000×1800 [2] / —	holographic

1. Diameter and length shown
2. height X width X depth shown

hologram obtained either through its reaction with coherent light or by machine processing of the signals obtained (using the Fourier method), with

addition of the necessary corrective coefficients that take into account curve on the wavefront of the sonar signals.

In the diagram reconstruction method the approaching acoustic field is converted with an antenna array made up of a large number of piezoelectric receivers into electrical signals that are passed to diagram-reconstruction circuits that form a multistage sheaf of spicular diagrams along the direction of the antenna grid. The diagram-reconstruction circuits also compensate for curve on the wavefront of the acoustic signal by introducing phased delays in the signals from the antenna array.

Of all these methods of underwater imaging, experts in the West prefer the acoustooptic method, which makes it possible to operate in real time with a wide angle of vision with acceptable weight and size for the equipment.

According to the foreign press, the progress made in the field of microprocessor equipment and the new methods for handling acoustic signals using charge-coupled instruments and devices for surface acoustic waves give grounds for suggesting that underwater acoustooptic imaging systems developed using the holographic and diagram-reconstruction methods will approach the acoustooptic method in terms of weight and dimensions of the equipment.

As in optics, the quality of the images obtained in underwater acoustooptic imaging systems depends on the nature of the reflection of the incident wave from the target. Diffuse reflection provides a good-quality image while specular reflection creates highlights and spottiness. The nature of the reflection is determined mainly by the relationship between height of uneven elements on the surface of the target and the wavelength of the radiating signal. For acoustic systems this relationship is three orders of magnitude less than for optic systems, and accordingly the quality of acoustic images is always worse than that of optical images. Typical kinds of acoustic images and an overall view of acoustooptic equipment are shown in the figures, while the main tactical and technical features of underwater acoustooptic imaging equipment are presented in table 1 above.

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RE-EQUIPPING THE JAPANESE NAVY WITH COASTAL PATROL AIRCRAFT

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 3, Mar 87
(signed to press 5 Mar 87) pp 59-60

[Article by Capt 1st Rank Yu. Yurin: "Reequipping the Japanese Navy with Coastal Patrol Aircraft"]

[Text] The Japanese Navy command is paying great attention to reequipping its coastal patrol air forces, which are an important resource for carrying out reconnaissance at sea and dealing with submarines using the P-3C Orion produced under U.S. license by the Kawasaki firm.

The combat resources of the naval air forces now include five coastal patrol air wings (Nos 1, 2, 4, 5 and 31), which include seven patrol squadrons (Nos 1, 2, 3, 4, 5, 6 and 31). In addition, one independent test patrol squadron (No 51) and two training squadrons (Nos 203 and 205) also have coastal patrol aircraft. The total number of coastal patrol aircraft is about 100 (32 P-3C's, 58 P-2J Neptune's, 8 PS-1 (Shin Meyva's)). Each aircraft carries 4 to 12 Mk44 or Mk46 torpedoes or 4 to 16 157-kg type 67 depth charges and 6 to 8 127-mm and 55-mm unguided air-launched projectile, and also search radars, magnetic detectors and sonobuoys. In addition the P-3C aircraft can carry up to 4 HARPOON antiship missiles instead of part of the regular antiship weapon stores. The Japanese Navy leadership considers the P-2J and PS-1 obsolete and has outlined a program gradually to replace them with new modified P-3C's.

By the end of fiscal year 1986 (starting on 1 April) orders had been placed for 60 P-3C's to be built. Some 32 of them have already been delivered to naval units, thus mainly completing the refitting of four combat squadrons (Nos 3 and 6 patrol squadrons of the No 4 Air Wing at the Atsugi Air Base, and Nos 2 and 4 patrol squadrons of the No 2 Air Wing at Hachinoe), each of which has 7 to 9 P-3C's. In addition, No 51 Independent Patrol Squadron has three of these aircraft. It is planned to deliver the other 28 aircraft (now in various stages of production) to naval air units over the next three financial years. These will be delivered to the No 1 (Kanoya Air Base), No 5 (Naha) and No 205 (Simosa) squadrons.

The current five-year building program for the Navy provides for additional allocations to purchase another 40 P-3C's, with deliveries planned for 1990-1993. Thus, during the next financial year funds have already been requested to acquire the next 9 aircraft. The total number of aircraft purchased will be at least 100. The identification numbers of Japanese P-3C's are 5001

through 5100 (Nos 5001 through 5032 have already been assigned for squadrons). According to the foreign press, the average cost of one aircraft for the Japanese Navy is 11.119 billion yen, and according 100 of them will cost the Japanese taxpayer the astronomical sum of more than 1.1 trillion yen.

According to the foreign press, by April 1994, taking into account the obsolete models withdrawn from service, the coastal patrol air forces will have 100 patrol aircraft (94 P-3C's and 6 P-2J's) organized in 10 combat squadrons. It is planned to station two squadrons each at the Atsugi, Kanoya, Naha and Hachinoe air bases and one each at Simosa (9 or 10 P-3C's) and Iwakuni (6 P-2J's and 3 or 4 P-3C's).

The aircraft inventory in the Japanese Navy now has a larger number of P-3C Orion's than similar aircraft in leading NATO countries such as Great Britain and France. In the years immediately ahead the country's naval air forces will be actively renewed and, according to Western military experts, in terms of numbers of P-3C coastal patrol aircraft the Japanese Navy will be firmly in second place in the capitalist world. By the mid-Nineties the inventory of modern aircraft in Japan's coastal patrol air forces will be about 50 percent the size of the U.S. inventory. Also of great importance is the circumstance that Japanese P-3C aircraft can carry the HARPOON antiship missiles developed on the basis of the XSSM-1. In 7 or 8 years the total number of antiship missiles that can be carried by all coastal patrol aircraft at the same time will almost triple (to 400). In the opinion of foreign military experts, while retaining the same overall total number of aircraft, thanks to qualitative improvements, by the early Nineties the Japanese coastal patrol air forces will double or triple its combat capabilities.

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U.S. AND NATO MILITARY FACILITIES ON TURKISH TERRITORY

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[Article by Col A. Gornostalev: "U.S. and NATO Military Facilities on Turkish Territory"]

[Text] Unceremoniously declaring strategically important regions of the world to be its own sphere of "vital interests," and building up its preparations for war against the Soviet Union and the other Warsaw Pact countries, the U.S. administration is involving its NATO Partners increasingly deeply in these dangerous actions, particularly Turkey. Turkey is regarded by militarist circles in the West as a main outpost against the Soviet Union and the progressive states in the Mediterranean on NATO's southern flank, and also against countries in the Near and Middle East, and as a favorable region to organize intelligence gathering of various kinds against those countries and their armed forces.

The Republic of Turkey has a long border with the USSR, Bulgaria and other countries. Many important international land, sea and air routes pass through its territory. The straits in the Bosporus and the Dardanelles, together with the Sea of Marmara form the only maritime route between the Black Sea and the Mediterranean. In February 1986 the U.S. Secretary of Defense C. Weinberger stated that "Turkey, which has land and sea borders with the USSR and Bulgaria, occupies a key position on the Soviet Union's route into the Mediterranean and is an outpost on NATO's southern flank." The U.S. military-political leadership does not hide the fact that it is precisely this circumstance that is largely the reason for its very close attention to this bloc partner. More than 60 military bases and installations are in use on Turkish territory in the interests of the U.S. armed forces, and a considerable amount of nuclear munitions have been deployed there.

Since 1954 several agreements have been concluded between Turkey and the United States on the use of military bases and installations. The latest of them, "On Cooperation in the Field of Defense and the Economy" covering the period 1985 through 1990, was initialed late last year and it is envisaged that it will be signed in the near future. In accordance with this agreement, the United States is promising to provide the Turkish armed forces with modern combat equipment and various kinds of material-technical supplies, and also to help in training and instructing personnel. In addition the U.S. government has assured Turkey that the United States and its allies will give it top

priority in implementing the program for military purchases. In exchange, the Pentagon will obtain the right to make further use of military bases and installations on Turkish territory under conditions of joint control over their activity.

It is not happenstance that highly placed military and civilian emissaries from Washington have recently been visiting the Turkish capital more frequently. During the course of their meetings they have been arguing the need to modernize the radio and electronic intelligence-gathering facilities and various kinds of communications centers, including those used for communications with the U.S. 6th Fleet operating in the Mediterranean, and also to reconstruct existing air force and naval bases and build new ones in order to provide support for reinforcements of rapid deployment forces from the United States. Neither has the Pentagon abandoned its sinister plans to create stores of lethal chemical weapons in Turkey and increase the numbers of nuclear munitions and delivery systems for them.

The total number of U.S. servicemen in Turkey is close to 5,000 (most of them Air Force personnel).

The main military bases and installations on Turkish territory are shown in figure 1 below.

The headquarters of a joint U.S. military mission, JUSMMAT (Joint United States Military Mission for Aid to Turkey), which coordinates actions to implement the military aid agreement between Turkey and the United States, is located in Ankara. In addition, the headquarters of the Air Force group TUSLOG (Turkey United States Logistics Group), designed to provide services and material-technical supply for U.S. Air Force installations in Turkey, is also located there.

One of the largest tracking centers to monitor the activities of the Soviet armed forces and the launching of ICBM's from USSR territory has been set up in the region of Pirinclik (25 kilometers west of Diyarbakir in East Anatolia). It is equipped with three powerful radars and automatic data processing equipment. The equipment installed on the territory of this center (46 square kilometers) includes a SATCOM satellite communications station under a radiotransparent dome and receiving and transmitting radio stations, and the facilities erected include an electric substation, barracks and servicing and technical buildings, POL stores and material-technical facilities, equipment stores and repair shops. The center is strongly guarded. All the necessary conditions have been created within it for operations under extraordinary conditions.

A radio and radiotechnical intelligence-gathering with modern electronic and communications equipment and antennas under domes has been set up on the Black Sea coast in the area of Sinop. It collects intelligence data on the activities of the Soviet Air Force and Navy in the Black Sea area. In the region of Anadolukavagi (in the Bosporus Strait) a radio and radiotechnical intelligence-gathering center has been set that provides the U.S. Navy with

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intelligence on the activities of USSR warships in the Black Sea and the region of the straits. It has several antenna installations with modern

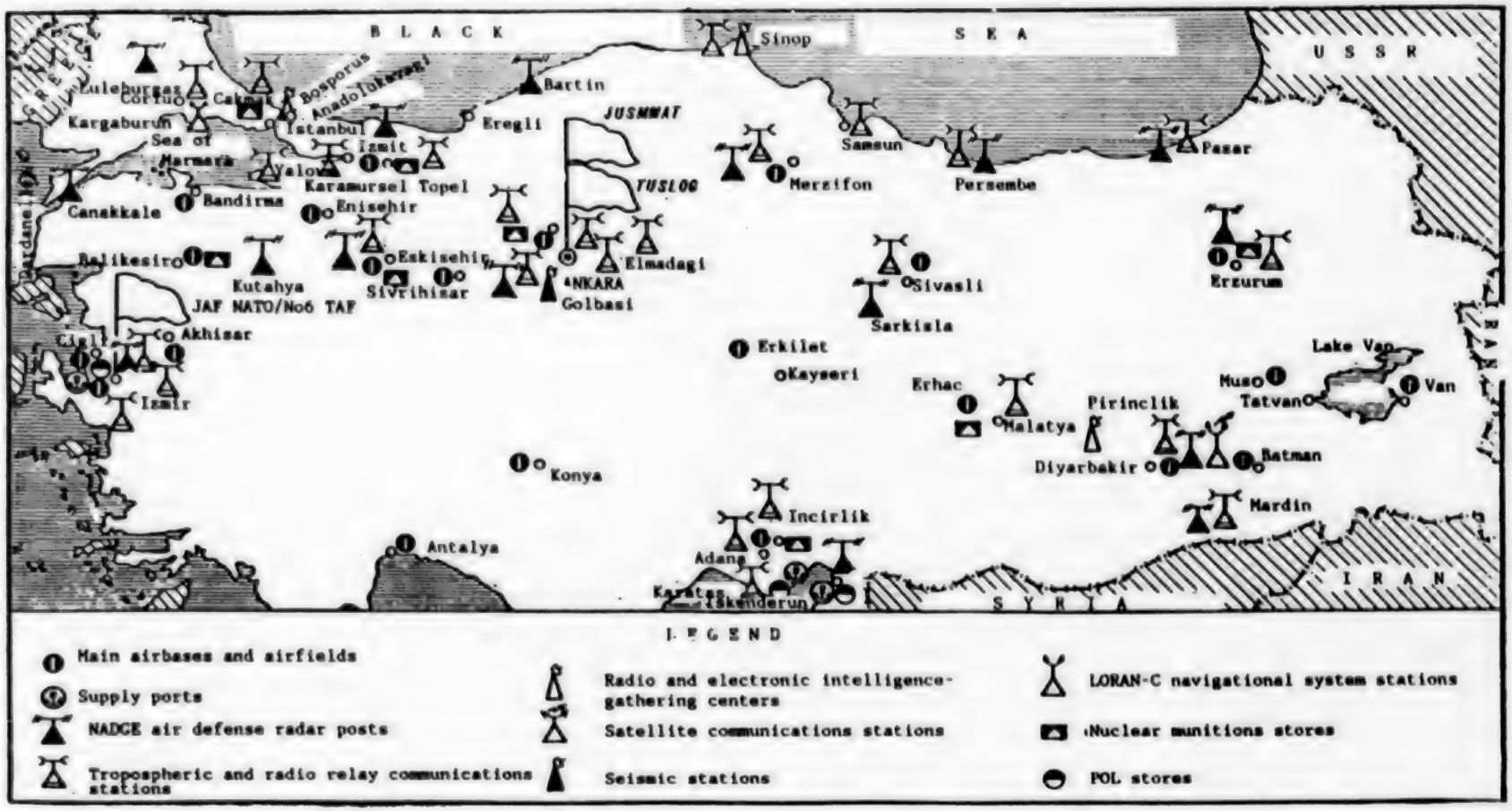

Figure 1. Main U.S. and NATO Military Facilities in Turkey

electronic equipment beneath a radiotransparent dome, together with various communications facilities and a complex of servicing and technical buildings.

A seismic reconnaissance station has been located in the area of Golbasi (16 kilometers southwest of Ankara), which not only evaluates the seismic situation in the country but also collects and processes data on nuclear tests.

A LORAN-C station has been set up on the northern coastline of the Sea of Marmara to provide support for flights by Air Force combat and transport aircraft and radio navigation facilities for U.S. and NATO ships in the Mediterranean region. It has an antenna field on its territory, and a complex of buildings has been erected.

The largest U.S. air base in the Near East is located in southern Turkey in the area of Adana city, at Incirlik, where tactical aircraft of the U.S. Air Force are always on alert duty. The U.S. command has on more than once occasion already used this base to help its ally Israel, during the aggression against Lebanon, and also for spying against the Soviet Union. The air base has a runway more than 3,000 meters long and can take strategic bombers. Its territory includes taxiways, warehousing, including for nuclear munitions, shelters for aircraft and communications centers; radio navigation equipment has been installed, and its has headquarters and servicing and technical premises. Washington continues to get agreement from Ankara to increase the number of U.S. nuclear-capable aircraft based there in peacetime.

In November 1982 a U.S.-Turkish memorandum of mutual understanding was signed that provided for the deployment, in line with NATO plans, of U.S. tactical air forces in Turkey at the forward air bases at Erzurum, Van, Batman, Mus, Diyarbakir, Mirtag, Eskisehir, Izmir and Geyikli. Most of them are located in the immediate vicinity of the border with the Soviet Union.

U.S. specialists are still taking steps to modernize existing airfields and at the same time they are building a new air base with a runway longer than 3,000 meters in the region of Mus.

Two air bases have been built in the cities of Izmir and Geyikli on the Aegean coast, designed as bases for the Turkish tactical air force. They are also used by subunits of the U.S. Air Force when they are taking part in NATO exercises.

Despite the obvious danger of being subordinate to the adventurist policy of the United States, the Turkish military-political leadership is making new concessions to the Pentagon. In this case it is a matter of basic agreement to revise a number of U.S. proposals and demands, in particular, to create stores of nuclear weapons and munitions on Turkish territory in peacetime for contingents of U.S. troops and to offer extensive privileges to maintain them. In his statement at a press conference in February 1986 at the U.S. embassy in Ankara, U.S. Assistant Secretary of defense R. Perle stated that the agreement proposed by Washington to put U.S. armed forces in Turkey upon the outbreak of war provides for assigning the rear organs of the Turkish armed forces the task of receiving U.S. troop reinforcements at ports and airfields, the

movement of freight, defense of airfields in joint use, carrying out maintenance and repair work and so forth.

According to the foreign press, warehouses and points for storage of U.S. nuclear weapons earmarked to support the activity of U.S. Air Force tactical aircraft, the Turkish armed forces and the armed forces of other NATO countries, have already been set up at the air bases in Balikesir, Topel, (Murted), Incirlik, Eskisehir, (Erhac) and Erzurum and in the region of Cakmakli. They are maintained and guarded by U.S. personnel (special detachments from the TUSLOG group). According to the foreign press, more than 500 nuclear weapons have been stored at warehouses in Turkey.

Centers to store and supply POL materials and other material-technical supply items to support subunits of the U.S. armed forces stationed in Turkey have been set up in the ports of Iskenderun, Yumurtalik and Izmir. About 20 percent of the stores of fuel set up on Turkish territory are earmarked for ships of the U.S. 6th Fleet. Fuel is carried to the air base at Incirlik along an American pipeline 70 kilometers long, running from the port of Yumurtalik.

A station for tropospheric communications and a radio relay line have been set up on Turkish territory to support control of U.S. subunits located at bases and installations. Important communications centers and stations have been set up in the area of Izmir, Ankara, Adana, Sinop, Malatya, Diyarbakir, Erzurum, Incirlik, Corlu, Cakmakli, Karamursel and other towns. One of the largest is the distribution center for tropospheric communications in the region of Izmir. In addition, various types of satellite communications stations are in operation at virtually all U.S. bases and installations in Turkey, making it possible significantly to improve operational control of subunits of the U.S. armed forces stationed on Turkish territory.

According to the foreign press, various military bases and installations for NATO have been located in Turkey. The chief of them include the following.

The headquarters of the NATO Land forces in the southeastern part of the South European theater of military operations and the headquarters of the NATO 6th Joint Tactical Air Force Command, which includes combat units of the Turkish Air Force (more than 300 combat aircraft) and the U.S. Air Force 39th Tactical group, are located in Izmir.

The air bases (see table 1 below) are also considered to be important NATO military installations in Turkey. About 20 of the total number of airfields (up to 100) are at the bloc's disposal, and in peacetime they are being modernized in line with NATO plans and being used by the Turkish Air Force. In the event of a sharp deterioration in the international situation in the region or when bloc exercises are conducted, these airfields are handed over to the control of the NATO combined air forces command.

In line with the standards adopted by NATO, the air bases and airfields located on Turkish territory have the following: one or more runways with a

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Table 1. Characteristics of U.S. and NATO Airfields on Turkish Territory

Name of airfield	Coordinates		Height above sea level meters	Runway		
	latitude North deg/min	longitude E deg/min		length X width, m	surface	runway heading
Akhisar	38—48	27—50	75	3000 x 45	asphalt	140—320
Antalya	36—55	30—48	51	3400 x 45	concrete	180—360
Balikesir	39—37	27—56	101	2990 x 43	concrete	180—360
Bandirma	40—19	27—59	51	2990 x 45	concrete	180—360
Batman	37—56	41—07	554	3018 x 45	concrete	20—200
Van	38—28	43—20	1668	2750 x 45	asphalt	30—210
Diyarbakir	37—54	40—12	686	3536 x 46	concrete	160—340
Enisekir	40—15	29—33	232	2989 x 45	concrete	70—250
Incirlik	37—00	35—26	73	3048 x 61	concrete	50—230
Izmir	38—17	27—10	116	2350 x 45	asphalt	170—350
Konya	37—59	32—34	1032	3441 x 43	concrete	20—200
Merzifon	40—50	35—31	544	3200 x 45	asphalt	50—230
Murted	40—05	32—34	843	3079 x 42	concrete	30—210
Sivas	39—49	36—54	1592	3810 x 30	concrete	10—190
Sivrihisar	39—27	31—22	970	3353 x 50	concrete	110—290
Topel	40—44	30—05	50	2987 x 45	concrete	90—270
Cigli	38—31	27—01	5	2750 x 45	asphalt	170—350
Eskisehir	39—47	30—35	785	3048 x 46	concrete	90—270
Erzurum	39—57	41—10	1756	3810 x 30	concrete	90—270
Erkilet	38—47	35—30	1052	2438 x 45	concrete	70—250
Erhac	38—26	38—05	862	3319 x 46	concrete	30—210

solid pavement, longer than 2,400 meters and up to 60 meters wide; one or two taxiways that can serve as reserve runways; group and individual hard

standings for aircraft, including for aircraft on alert; a command-ATC post; reinforced coverings and hangars for aircraft; repair workshops; air defense resources. Radio facilities, lighting, and communications equipment are installed at all airfields to provide for takeoffs and landings day and night and in adverse weather conditions. Most airfields have POL stores hooked into the western and eastern NATO pipeline networks in order to insure centralized and uninterrupted supplies of fuel for the aircraft.

The air defense system in Turkey is part of the NATO NADGE [NATO Air Defense Ground Environment] joint automated air defense system. It includes 16 radar posts usually located close to the NATO joint air forces air bases and U.S. installations. Each radar post is equipped with the latest radars under radiotransparent domes and they are on constant alert.

The NATO joint armed forces command assigns Turkey a very important role in the long-range radar detection system (AWACS). The first detachment of E-3A aircraft as an element of this system has been operating in Turkey since the latter half of 1983, using the forward air base at Konya. The airfield was modernized in short order, making it possible to receive and service the long-range radar detection aircraft and provide control for the E-3A's. Electronic equipment has also been installed to process intelligence data, along with communications facilities and a complex of servicing and technical buildings. The overall mission of the AWACS system includes detection and observation of airborne and maritime targets in the far approaches. In the opinion of Western military experts, use of the NATO NADGE air defense system and the E-3A aircraft in the AWACS system makes it possible to monitor Turkey's airspace and the airspace of adjacent countries to a considerable depth and at various altitudes.

In order to insure reliable and secure control of NATO armed forces in the South European theater of military operations a system of tropospheric and radio relay communications has been developed; this system is a multichannel comprehensive network. It makes it possible to maintain communications with NATO headquarters, air bases, air defense radar posts and other installations. The system is hooked into the U.S. and Turkish communications systems via centers in Izmir and Ankara. Turkey is also hooked into the NATO satellite communications system and to this end two satellite stations are in operation in the Izmir and Ankara regions.

In order to insure material-technical supply for groupings of the NATO joint armed forces in wartime, a developed system of warehousing has already been put in place, and considerable numbers of warehouse premises have been constructed to hold weapons stores and stores of combat equipment and munitions, fuel, food and medical supplies, making it possible to engage in combat actions for long periods. According to the foreign press, most of these supplies are concentrated in East (Frakiya), the Black Sea straits zone and border areas near the USSR.

Under the pretext of giving Turkey military aid, U.S. imperialist circles and their allies are striving to extend their rights to use military bases and installations on the country's territory. However, democratic and progressive forces in Turkey are condemning the military agreements with the United

States, emphasizing that the U.S. presence on Turkey's territory is a threat to the country's tranquility and independence and to the peoples in the Near and Middle East and the Mediterranean and Black Sea areas.

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DEPLOYMENT OF THE 'GWEN' RADIO COMMUNICATION SYSTEM

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(signed to press 5 Mar 87) pp 73-74

[Article by Col V. Mitrich: "Deployment of the GWEN Radio Communication System"]

[Text] While continuing its multifaceted steps to prepare to unleash a war using nuclear weapons, at the same time the U.S. administration is working to create an extensive network of protective installations and improve its control system, which, in the opinion of Pentagon strategists, should insure for the United States "survival" in such a conflict. Thus, the second stage of the GWEN (Ground Wave Emergency Network) long-wave radio communication system is now being completed. U.S. military experts think that since it is highly reliable and stable it will be able to insure control of resources available to the Strategic Air Force command and the joint U.S.-Canadian air and space defense command on the North American continent under conditions of all-out nuclear war.

The basis of the GWEN system is automatic relay stations operating a low frequencies (150 to 175 kilohertz) in the LF waveband whose radio waves are propagated right round the Earth's surface (without being reflected from the ionosphere), which makes them immune to electromagnetic disturbance. These stations are located on U.S. territory 240 to 320 kilometers apart. The metal masts for their antennas are about 90 meters high and the plane sections make up squares of about 60 centimeters. The relay stations cover a relatively small area of about 4.5 hectares. For comparison we note that the area occupied by each of the three antenna fields for the transmitters of OTH radar stations is 180 hectares.

The transceivers operate in relay mode. The electronic equipment with packet switching and a processor and additional receivers (used to monitor the status of neighboring stations and evaluate channel quality) make it possible to transmit radio signals along a roundabout route when there is an overload or malfunction and even if several stations are destroyed. When this is done an optimal routing is selected to transmit information and a continuously functioning complex is created. Information is transmitted in 30-second bursts and reproduced in printed form. One flaw in the system that has been

noted is that it cannot carry telephone communications and transmission of reports via the relays is at a speed of only 75 bits/second.

The GWEN system also includes the following: terminal UHF stations (225 to 400 megahertz) for report input and output, coupled directly or via radio relay channels to the long-wave transceivers; long-wave receiving devices at strategic missile and SAC aircraft launch posts and other installations that receive commands for the use of their weapons.

During the first stage of development for GWEN, which was completed in April 1984, experimental long-wave stations were built to check the feasibility of transmitting reports via several long-wave relay stations. In the second stage (through October 1986) it was planned to bring 56 relay stations into operation to link command posts together, and also to provide communications with bombers and tankers in the Air Force Strategic Air Command. However, the Western press reports that it was not possible to develop several stations because in some places the public objected to them. Final completion of work was postponed to May 1987. In the final stage (through 1992) it is planned to bring the system into full operation.

According to the press reports, it will include 127 automatic relay stations instead of the 236 planned earlier. The antennas of regular broadcasting stations can be used to operate GWEN. In 1987 it is planned to start development work on the final receiving devices for mobile facilities and continue development of compact long-wave receivers for strategic bombers. It is expected that this will improve reliability for passing commands to the strategic air force during an enemy attack.

The Department of Defense has allocated almost $1 billion to develop GWEN. Compared with expenditures on other Pentagon programs this figure is not very impressive, but this radio communications system is only part of an extensive plan to develop a military infrastructure that will supposedly give the United States an opportunity not only to wage a nuclear war but even "survive in it." To this end it is planned to allocate $40 billion, which yet again emphasizes the desire of the U.S. militarists to continue along their dangerous course of preparing to unleash war.

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U.S. UNMANNED DRONE

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 3, Mar 87
(signed to press 5 Mar 87) pp 76-77

[Article by Lt Col V. Mishukov: "A U.S. Unmanned Drone"]

[Text] The American firm Boeing is developing an experimental model of a multirole unmanned drone designated the BRAVE-3000 (Boeing Robotic Air Vehicle). According to reports in the foreign press it is designed to destroy armored equipment, jam enemy radars and communications and control facilities, and carry out other missions such as final target reconnaissance and evaluation of the results of strikes. Depending on payload and mission the unmanned vehicle has a range up to 500 kilometers. Boeing is hoping to interest land forces and the air force command in the vehicle, which could use it for actions against enemy second-echelon forces.

Externally the BRAVE-3000 is similar to a cruise missile, with a longer fuselage, a high, unswept wing and a cruciform tail section. A vertical control surface is located beneath the forward part of the fuselage, essential, in the opinion of Boeing specialists, to create lateral aerodynamic force during the terminal phase of the flight trajectory by increasing target accuracy through improved maneuverability. All aerofoils are built in [skladyvayushchiysya]. Composite materials are used extensively in the structure of the unmanned drone. The vehicle is launched from a container using a rocket booster that has its own built-in cruciform tail assembly. It is planned to carry a package of three drone containers and a hoist for replacing them, and provision has also been made for a version that is launched from an aircraft. The flight control system operates preprogrammed or using a combined system. The onboard equipment includes a microprocessor, autopilot, and navigation system operating on a dead-reckoning principle. Later it is planned to install a receiver for the NAVSTAR satellite navigation system in order to improve flight accuracy.

The weight of the BRAVE-3000 without booster is 240 kilograms, of which more than 1[illegible]0 kilograms goes for fuel and payload (warhead, equipment to provide immunity against jamming and other equipment), and it travels at 700 kph. It is 3.5 meters long with a wingspan of 2.3 meters; the greatest diameter of the fuselage is 0.3 meters. Loiter time at a range of 400 kilometers with a payload of about 50 kilograms is 1 hour. The power plant is an English NPT-171 turbojet developing a maximum thrust of about 80 kilograms force. The drone is a one-use-only vehicle because the Boeing specialists think that

multiple-use of this class of vehicle is too complex and too expensive, and in addition, while waiting for the unmanned drone to return the ground crew and the large amount of equipment needed to service it are in danger of being attacked by the enemy.

The foreign press notes that the firm has already conducted test flights of the unmanned vehicle in order to check out the control and navigation systems and determine the altitude range and flight speed and test startup of the engine while in flight.

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NEW METHOD OF USING SONOBUOYS TO SEARCH FOR SUBMARINES

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(signed to press 5 Mar 87) pp 77-78

[Article by Rtd Capt 1st Rank A. Prostakov, candidate of military sciences: "A New Method of Using Sonobuoys To Search for Submarines"]

[Text] Sonobuoys are the main method used by aircraft to search for submarines. However, in contrast to today's shipborne sonar equipment employing towed antennas, they do not have a good acoustic antenna in the horizontal plane and consequently do not possess the advantages inherent in that equipment, namely, large range, high selectivity and accuracy in determining the bearing of a target.

In order to improve effectiveness when searching for submarines using airborne sonobuoys the American firm Lockheed has developed a new method for using them, providing for the creation of a spatial antenna array from the buoys, similar to the antenna towed by a ship. However, the complexity lies in the fact that after the sonobuoys have been deployed in the sea they cannot be held permanently at their initial locations relative to each other but drift in different directions; and corrections cannot be made for this drift.

The essence of the new method for using sonobuoys, which was developed under the STRAP (Sonobuoy Thinned Random Array Project), consists of the following.

A group of passive sonobuoys (up to 20) are dropped in the search area. They include four sonobuoys that have been modified with additional low-power omnidirectional acoustic emitters. When operating, noise from the surrounding space, including noise from a target, and signals emitted by the modified buoys arrive in the receiving channel of each sonobuoy in place. All this information is transmitted to a helicopter or aircraft where onboard equipment, including computers, immediately process it.

Since the radiated signals will not arrive simultaneously in the other sonobuoys in the group, it is possible to determine with sufficient accuracy the relative position of all the sonobuoys in place. Thanks to this it becomes possible to process the signals from all the sonobuoys simultaneously, as in an antenna array. In addition, in the opinion of Western experts, knowing the relative positions of the sonobuoys in a group will also help somewhat to increase the range of initial detection of a submarine and lock onto it before the contact is lost.

According to the foreign press, work is now underway to determine the optimal number of sonobuoys deployed together in a group and clarify the tactics for their use. The U.S. Navy has allocated $1.8 million for this for financial year 1986.

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FOREIGN MILITARY NEWS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 3, Mar 87
(signed to press 5 Mar 87) pp 79-80

[Unattributed reports: "Foreign Military News"]

[Text] UNITED STATES

With delivery of the 1,715th AGM-86B air-launched cruise missile to the Air Force in October 1986 the production program for these missiles has been completed. It is planned to use 180 B-52G's and B-52H's, whose modernization continues, along with the latest B-1B strategic bomber, to carry these missiles.

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Exercises for the infantry company of the 2nd Infantry Battalion of the National Guard 29th Light Infantry Division took place in October 1986. Missions involving work on the organization and conduct of combat actions were carried out in northern Norway jointly with the personnel of infantry subunits of the Norwegian land forces. It is planned to conduct similar exercises on an annual basis.

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A total of 94,000 AT-4 84-millimeter antitank grenade launchers have been purchased from the Swedish Foerende Fabriksverken--FFV--for the U.S. Army at a cost of 420 million Swedish krona. Deliveries will start next year.

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The land forces command is considering the question of the possible use of railroad transport (medical trains) to evacuate the wounded from field hospitals to rear medical facilities. This idea was first put into practice during the SOUTHERN SENTINEL and REFORGER exercises that took place within the framework of the NATO joint armed forces AUTUMN FORGE maneuvers.

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A total of 62 of the 77 C-5A heavy strategic military transports in the country's Air Force have been modernized and returned to service (now

designated the C-5B). It is planned to complete modernization of the remaining aircraft by the middle of this year.

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Northrop has halted development work on the F-20 Tigershark fighter under a program that has been underway for 8 years. It has been suggested that the data obtained will be used in the future during development of the promising U.S. ATF tactical fighter.

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A rendezvous of three STURGEON-class nuclear submarines (SSN653 RAY, SSN666 HAWKBILL and SSN678 ARCHERFISH) took place in May 1986 at the North Pole. During the course of their cruise the feasibility of joint actions under the ice was checked out.

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The first launch of the SLAT AQM-127A supersonic low-flying airborne target drone (range 55 miles, speed about Mach 3) designed for personnel training with sea-launched surface-to-air missiles, was planned for March this year. It is planned to purchase up to 1,000 of these drones.

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The U.S. Navy does not intend to move from its forward base point at Holy Loch (Great Britain) even after the LAFAYETTE-class SSBN's armed with POSEIDON-C3 missiles (range up to 4,600 kilometers) based there leave in connection with their withdrawal from the fleet's active list and their replacements, OHIO-class SSBN's with TRIDENT-2 missiles (with a range of more than 11,000 kilometers), are based at Kings Bay Naval Base (Georgia). It is a question of new plans for using the base at Holy Loch within the framework of the increasing aggressiveness of U.S. base policy.

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Medical services for servicemen and their families at the Whidbey Island Air Base (40 kilometers north of Seattle in Washington State where an air wing of medium ground attack and electronic combat aircraft, four reserve patrol squadrons and other subunits have been moved) will be provided by a hospital. Counting those temporarily assigned from air force subunits, the staff will be made up of 25 physicians, 20 middle-echelon medical personnel, 11 administrative officers and 140 rank-and-file personnel. About 100,000 patients are seen every year.

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GREAT BRITAIN

No 9 Tactical Fighter Squadron (equipped with the Tornado-GR1) has been transferred from the air base at Honington (Great Britain) to the air base at Brueggen (FRG).

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The MERMAID EXPLORER commercial underwater towing vehicle is undergoing tests to determine the feasibility of using it for military purposes (dealing with mines, searching for sunken objects).

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Repairs to the aircraft carrier ILLUSTRIOUS following a fire in the engine room have cost 4 million pounds sterling and taken 4 months.

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FRG

Territorial troops (divided organizationally into three territorial commands--Schleswig-Holstein, North and South, including 5 military districts, 29 district defense headquarters and 80 regional defense headquarters) are numbered at about 50,000 men, approximately 700 tanks and more than 600 field artillery mountings and mortars, and more than 600 antitank weapons, including about 300 guided antitank missiles.

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In-flight refuelling tests have been conducted using specially equipped Tornado tactical fighters. Specialists from the MBB concern that produces this aircraft took part in the test along with representatives from the U.S. Air Force, which made KC-135 tankers available. In the future the FRG Air Force and the air forces of other NATO countries that have the Tornado intend to equip it with an in-flight refuelling system in order to extend its combat capabilities.

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FRANCE

It is planned to deliver the first series-produced LECLERQUE tanks (previously known as the EPC--Engin Principal du Combat) to units in the 2nd Armored Divisions in 1991.

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The new ANS supersonic antiship missile being developed jointly with the FRG will possibly replace the EXOCET. The ANS has a range of more than 30 kilometers and travels at speeds in excess of Mach 2. It weighs 200

kilograms. It is proposed to use it to arm helicopters and fixed-wing aircraft and ships, and also coastal defense units.

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ITALY

It has been decided to modernize the 18 "Atlantic" coastal patrol aircraft making up the 18th Air Wing. In addition to work on the airframe they are to be fitted with improved onboard equipment, including surface target and submarine search equipment. Modernization of the aircraft envisages the possibility of using the latest promising equipment with them.

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Nine sets of AN/SQQ-14 sonar equipment have been purchased for the (LERICHE)-class search minesweepers.

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CANADA

It has been decided to form an electronic combat battalion with headquarters in Kingston (Ontario), which will make up part of the 763rd Communications Regiment in the organized reserve (Ottawa).

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The question is being considered of whether to replace the CH-124 Sea King antiship helicopter (32 of them) with the more up-to-date EH-101 which is being developed jointly by Great Britain and Italy, or with the American SH-60B Sea Hawk.

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The NETHERLANDS

An F-16 Fighting Falcon fighter from No 322 Squadron has crashed. This is the 15th F-16 lost from the 150 in the country's Air Force. The investigation of the crash continues. According to the Dutch defense minister the reason for 60 percent of previous F-16 losses was pilot error.

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TURKEY

During the first stage of a joint U.S.-Turkish plan is intended to build 160 F-16 fighter-bombers (at a factory near Ankara). During the early stages of the project, whose cost is estimated at $4.1 billion, the aircraft will be assembled in Turkey using components supplied from the United States.

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NATO

During the period 1963 through 1984 the NATO member countries conducted 548 nuclear tests to develop their nuclear potential, including 414 by the United States and 118 by France.

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An agreement between Italy, the Netherlands, Great Britain and Spain has been ratified jointly to develop the Tonal helicopter. The Italian firm Agusta has been selected as the main contractor.

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A special NATO working group has recommended to the bloc military leadership that the Turkish air base at Konya be selected as the new joint center for the combat use of tactical air forces; the present base is at Cold Lake in Canada. In addition, a joint technical maintenance and field repair center could be established at Konya for tactical fighters of the member countries' air forces.

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SWEDEN

First tests have been conducted with the air-launched version of the RBS15 antiship missile (weight 595 kilograms, warhead 200 kilograms, range 100 kilometers). The flight took place at a very low altitude. A sea-launched version of this antiship missile has been in service since 1985.

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ISRAEL

Amendments passed by the U.S. Congress in October 1986 provide for new privileges for Israel within the framework of the special favorable terms for military purchases and the conclusion of RDT&E contracts and weapons testing. In line with these amendments Israel will, in particular, be permitted to take part in the competitive struggle to obtain the $40 million allocated for U.S. non-NATO allies for RDT&E, and $50 million for research under the SDI program.

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The Israeli firm Elbit Computers has developed a set of infrared homing equipment for the U.S. Mk82 and Mk83 500- and 1,000-pound aerial bombs. Tests of the device were conducted in 1986. During the course of the tests four Mk82 bombs with the homing device were dropped from an F-4 fighter-bomber.

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SAUDI ARABIA

It is planned to conduct trials of the AMX-40 tank in this country with an eye to future purchases. It is planned to acquire about 250 of the tanks.

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IRAN

More than a million women aged 18 to 35 have undergone military training since the start of the Iran-Iraq war (September 1980). Some 90 training centers have been set up in the country for this purpose, in which more than 1,000 female instructors work alongside men. According to the British journal DEFENCE WEEKLY (December 1986) no woman has yet participated in combat actions.

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JAPAN

The National Defense Agency has decided to try to increase its appropriations for the 1987 financial year (starting on 1 April) by 7 percent. Western observers note that in terms of increases in military spending Japan has for a long time been the leader among U.S. allies.

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It has been proposed that all 13 divisions have a chemical protection platoon made up of a reconnaissance section and a decontamination section (a total of about 30 men with one vehicle for the reconnaissance section and four for the decontamination section). The first two platoons will be formed in the 2nd Infantry Division and the 7th Tank Division stationed on Hokkaido.

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The Navy budget for the 1987 financial year (starting on 1 April) will be 862 billion yen. It is planned to allocate funds to conclude new contracts for the building of seven ships and vessels (two DE229-class guided-missile frigates, one submarine of new design, two (HATSUSIMA)-class minesweepers, and two (TOWADA)-class general transports), and also 14 aircraft (including 9 P-3C coastal patrol aircraft) and 21 helicopters (17 HSS-9B's, 2 MN-53E's and 2 OH-6D's).

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Modernization of DD165, the (KIKUDZUKI) guided-missile destroyer, was completed in November 1986. The ship was equipped with HARPOON antiship missiles, SEA SPARROW antiship missiles,and a 20-millimeter VULCAN-PHALANX air defense complex, together with associated fire-control systems and new electronic equipment.

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AUSTRALIA

It is planned to lay a 2,700-kilometers optical cable, with no relay amplifiers, between Perth and Adelaide. According to the plan this work (estimated at 45 million Australian pounds) should be completed in 1989.

By 1992 it is planned to put in place a fiber optics communication network between the country's major cities at a total cost of 300 million Australian pounds. Work is already underway to lay fiber optics communications lines between Sydney and Melbourne (980 kilometers) and between Darwin and Adelaide (1,725 kilometers). The initial design capacity of the former is 60,000 telephones channels.

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MALAYSIA

Exercises codenamed (KEKAR MALINDO-9) were held in September 1986 on Penang Island. Those involved included the 2nd Infantry Division, two battalions from the 6th Independent Infantry Brigade, and also an infantry battalion from Indonesia's land forces. The exercises dealt with questions of conducting joint combat actions.

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